

TOWARD THE ENDLESS FRONTIER

*History of the Committee on Science
and Technology, 1959-79*



COMMITTEE PRINT

U.S. HOUSE OF REPRESENTATIVES



TOWARD THE ENDLESS FRONTIER

*History of the Committee on Science
and Technology, 1959-79*



COMMITTEE PRINT

U.S. HOUSE OF REPRESENTATIVES

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1980

35-120 O

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402



Foreword



THE GEORGE WASHINGTON UNIVERSITY,
GRADUATE PROGRAM IN SCIENCE,
TECHNOLOGY, AND PUBLIC POLICY,
Washington, D.C., November 20, 1979.

What Congress does is, to almost a total degree, influenced by what its committees do. Thus, an account of the evolution of a key congressional committee should be of interest to all those—scholars, activists, journalists, citizens, and even Congressmen themselves—with a concern about what happens on Capitol Hill. In putting together a history of the House Committee on Science and Technology, Ken Hechler has performed an invaluable service.

This history sees the world from the point of view of the small group of diverse individuals—members and staff—who work in an atmosphere of both cooperation and competition to apply the public interest, as they define it, to overseeing an area of Government activity. Hechler captures beautifully the congressional perspective on such matters, and the multiple influences of personality, self-interest, a concern for the good of the country, the internal workings of the Hill, and agency-Congress relationships on that perspective. He does not gloss over the fact that Members of Congress are human, with limitations as well as strengths. Thus, I think he has come close to portraying the reality of how Congress sees itself in operation.

The history draws upon rich sources not often available to an outsider, such as extensive personal interviews and the private records of the committee. These add a level of detail and reality to the account that makes it not only valid history but interesting reading.

The Committee on Science and Technology is to be commended on opening up its workings to the scrutiny of outsiders. Certainly those who worked with the committee from the outside may find that their perspective and interpretation of events differ from this account. But that is the point; Congress is a peculiar institution with a particular perspective, and Hechler's account reflects that perspective very well.

JOHN M. LOGSDON, *Director.*

TABLE OF CONTENTS



	<i>Page</i>
FOREWORD	III
INTRODUCTION	XXVII
ACKNOWLEDGMENTS	XXXI
I. IN THE BEGINNING, THE SELECT COMMITTEE	1
Accomplishments of the select committee	2
What led to the creation of the select committee?	2
Meanwhile at the White House	4
The Johnson committee hearings and Vanguard	5
Explorer I	6
Establishment of the select committee	6
Membership of the select committee (1958)	7
The high hopes of Overton Brooks	8
Future President joins select committee.	9
Hearings before the select committee	9
Birth of the House Committee on Science and Astro- nautics	13
Joint Committee or separate House and Senate Com- mittees?	15
Committee on Science and Astronautics officially sanctioned	17
The writing of the Space Act and the establishment of NASA	19
Patent policy	22
The National Aeronautics and Space Council	23
Annual authorizations for NASA	24
Reports of the House select committee	26
II. THE OVERTON BROOKS YEARS, 1959-61	29
Overton Brooks as chairman	29
Committee membership	32
Recruitment of staff	33
Getting the committee organized	37
First meeting of the committee	38
The first public hearing.	39
"The Next Ten Years in Space, 1959-1969"	40
The committee jurisdiction	41
Establishment of subcommittees.	46

II. THE OVERTON BROOKS YEARS, 1959-61—Continued	<i>Page</i>
NASA authorization in 1959	47
Annual authorization	49
Panel on science and technology	50
The passing of the scepter	60
III. RACING FOR THE MOON	63
Keith Glennan	64
The space race	65
Executive privilege	66
Transfer of the von Braun team to NASA	68
Life sciences	72
Project Mercury	73
A new Administrator for NASA	74
The Air Force challenge to NASA	77
Manned flight and the Kennedy budget	78
Effect of Gagarin flight	80
Reaction of President Kennedy	82
The committee seizes the initiative	83
Speeding up the lunar landing timetable	84
Shepard's suborbital flight	89
The committee and the lunar landing goal	93
IV. THE EARLY MILLER YEARS	95
Contrasts between Brooks and Miller	96
Relations with NASA	97
Membership and subcommittee organization	98
Jurisdiction	99
Staff operation	100
Delegation to subcommittees	102
Additional assistance	104
The committee and the Mercury program	107
The committee and Nova	108
Protecting launch operations	112
Karth and space science	114
Construction of facilities	117
Patents and inventions	121
Other areas of activity	123
The end of the honeymoon	124
V. SCIENCE, RESEARCH AND DEVELOPMENT, 1963-69	127
Why the Daddario subcommittee was formed	130
Formation of the Elliott committee	131
Daddario background	132
Philip B. Yeager	133
First hearings of Daddario subcommittee	134
Research management advisory panel	135

V. SCIENCE, RESEARCH AND DEVELOPMENT, 1963-69—Con.	<i>Page</i>
Science Policy Research Division	136
“Government and Science” seminar	137
National Science Foundation	137
Geographic distribution	139
“Basic Research and National Goals”	140
The move to the Rayburn Building	141
Three-year review of the National Science Founda- tion	143
Research in social sciences.	145
Vice President Humphrey’s visit.	147
Standard reference data legislation.	149
Fire research and safety.	150
Applied science and technological progress	150
Institutional grants for science education	151
Pollution abatement	154
Environmental quality	154
International science	155
International biological program	155
Other international activities	157
Management of Federal scientific activities	157
Technology assessment	159
Assessment of the Daddario subcommittee, 1963-69	161
VI. GEMINI AND APOLLO	163
Briefing Congress on the space program	167
Personnel of Manned Space Flight Subcommittee	169
1963: The first year of strong opposition	169
Joint U.S.-U.S.S.R. expedition to the Moon?	174
Visitor center at the Cape	176
Manned space program comes of age	178
Critical Issues Council	179
Bipartisan support for manned space flight	181
Minority staff	182
Victories in 1965.	184
Geographic distribution of research contracts	185
Passage of the NASA authorization bill in 1965	189
Future planning	190
Progress in 1966	191
“Fire in the Cockpit!”	193
The committee investigation	195
The Phillips report	197
Effect of the Teague committee hearings	201
A new Administrator: Dr. Thomas O. Paine.	206

VII. SPACE SCIENCE, APPLICATIONS, AND ADVANCED RESEARCH,	<i>Page</i>
1963-69	211
Weather satellites	215
Communications satellites	217
Electronics research center	219
Ranger	231
Lunar Orbiter and Surveyor	234
Mariner, Mars, and Venus	237
Earth resources technology satellites	239
Sustaining university program	242
Applications technology satellites	245
Other projects in space science and applications	246
Solids versus liquids	246
Subcommittee membership	248
Aeronautics	249
Nerva and nuclear power	255
Unidentified flying objects	257
Tracking and data acquisition	259
For the benefit of all mankind	263
VIII. DECISION ON THE SPACE SHUTTLE	269
Should we land on Mars?	269
Space Task Group recommendations.	270
Committee reaction to the Space Shuttle	271
Committee hearings on the Space Shuttle	272
Subcommittee markup of NASA authorization in 1970	272
Karsh blasts Shuttle	274
Full committee and NASA authorization in 1970	274
The split among committee Republicans	276
The Shuttle fight in the House	277
Karsh amendment against Shuttle	278
Fulton's recommit motion	279
Where do we go from here?	280
Committee leadership on future of space	280
Teague accentuates the positive	281
Winning Karsh's support for the Shuttle.	284
Floor debate on NASA authorization in 1971.	286
The committee and the 1972 Shuttle decision.	287
Committee reaction to the decision	288
The Presidential campaign of 1972.	289
"Bella, it is nice to have you with us"	290
Committee support in 1972 debate.	292

VIII. DECISION ON THE SPACE SHUTTLE—Continued	<i>Page</i>
The committee and Shuttle contracts	293
A new chairman for Manned Space Flight Sub- committee	295
Oversight on the Shuttle program.	296
The opposition in 1973.	297
The main engine problems in 1974.	297
The Shuttle and the automobile.	298
Austerity hits the Shuttle	299
The Air Force and the Shuttle	300
The fifth Space Shuttle Orbiter	300
The Shuttle in perspective	302
Supplemental for Shuttle	303
Additional funds required	303
IX. SPACE SCIENCE AND APPLICATIONS IN THE 1970's	307
Apollo applications becomes Skylab	307
Renewed support for Skylab	308
1973: The year of Skylab.	310
Scientific exploration of the Moon	313
The committee and Apollo in 1971-72	315
Apollo 17 and Chairman Miller's retirement	316
Teague succeeds Miller.	318
The four chairmen of Space Science and Applica- tions	320
1. Representative Joseph E. Karth of Min- nesota	320
2. Representative Thomas N. Downing of Virginia	324
3. Representative James W. Symington of Missouri	326
4. Representative Don Fuqua of Florida	333
Earth Resources Information System	339
Future space programs	340
Tracking and data acquisition	344
Technology utilization	353
Public affairs program	360
X. INTERNATIONAL SCIENTIFIC COOPERATION, 1959-79 . .	367
Peaceful exploration of outer space—1958	367
Chairman Brooks and international cooperation . .	369
Science committee leadership on international policy	369
Fulton pushes cooperation	370
International agreements and the tracking net- work	371

X. INTERNATIONAL SCIENTIFIC COOPERATION, 1959-79—Con.	<i>Page</i>
Anfuso advocates more cooperation	372
The U-2 fiasco	373
A committee divided	374
International science activities and the NSF	375
Chairman Miller and international cooperation .*	376
Radio astronomy, communications, and weather satellites	376
International satellites	377
Cooperation with the Soviet Union	377
A new tug-of-war over cooperation	378
The Outer Space Treaty of 1967	379
Competition versus cooperation	380
Influence of the Panel on Science and Technology .	382
Improving management of international sciences .	383
Applied science and world economy	384
International visits	385
Survey of international sciences	386
Chairman Miller and the Council of Europe	386
Confrontation meeting with the OECD	388
U.N. Conference in Vienna	388
Scientific cooperation with Canada	389
Visit of Canadian Senators	391
The political risks of international issues	392
American flag on the Moon—1969	394
Establishment of the international subcommittee .	395
Oversight subcommittee and international affairs— 1970	397
Farnborough and Paris Air Shows	397
Background of international subcommittee	398
Status of international cooperation—1971	399
The challenge of youth	400
International Science Foundation	401
Chairman Miller and international science—1971 .	401
High noon for the environment	402
Meeting of the ministers of science, OECD	403
A new chairman: Jim Symington—1972	403
The Lausanne Conference—1972	406
Cooperative agreements with the Soviet Union— 1972	407
Richard T. Hanna—1973-74	408
U.S.-U.S.S.R. advanced technology transfer	410
Technology transfer to underdeveloped nations .	411
Brussels conference on satellite transmissions . . .	411

X. INTERNATIONAL SCIENTIFIC COOPERATION, 1959-79	Con.	Page
Apollo-Soyuz		412
Keeping the committee members informed		413
Progress of negotiations—1972		415
Opposition to Apollo-Soyuz		416
The Teague-Winn trip to Russia—1972		416
Teague opposition to Apollo-Soyuz		417
Astronaut Stafford moderates Teague's opposition		419
Stabilizing factors		420
Safety and money limitations		421
Teague presses for more experiments		421
More money for experiments		422
Apollo-Soyuz a success—1975		423
DISPA—1975-76		424
Ray Thornton as chairman		425
International implications of early hearings—1975		426
Impact of Thornton subcommittee recommendations		427
Technology transfer to OPEC countries		428
U.S.-U.S.S.R. cooperative agreements—1975		428
Council of Europe Conference in 1975		429
DISPAC—1977-78, Chairman Scheuer		430
Jurisdictional problems.		432
Law of the Sea Conference		432
Comparative criminal justice		433
Nutrition		435
"Appropriate" technology		435
Science, Technology, and Diplomacy Act of 1978		436
Transfer of technology to OPEC countries		438
U.S.-U.S.S.R. cooperative agreements—1978		438
U.N. Conference on Science and Technology		439
Other DISPAC activities		440
European oversight trip		440
The Wydler reports		441
Antarctic Conservation Act of 1978		443
International space activities		445
Institute for Scientific and Technological Cooperation		446
United States-China scientific exchanges		447
European oversight trip in 1979		448
Conclusion		449

	<i>Page</i>
XI. INCHING TOWARD THE METRIC SYSTEM, 1959-79 . . .	451
Endorsement of metric system by panel—1961 . . .	452
Committee members take sides	453
H. R. Gross opposes metric—1962	454
Chairman Miller leads the fight—1965	456
Wydler cool toward metric	457
Judge Smith and the little red schoolhouse	458
Senator Pell leads Senate fight—1966	458
Science Committee effort	459
Wydler asks House to defer action	459
The House finally debates metric—1968	461
Chairman Miller as floor leader	462
Terms of the 1968 metric study law	463
Committee briefed on study report	464
Is metrication in the dictionary?	465
Small business opposition	466
Representative John W. Davis and the metric bill .	468
Labor insists on tool subsidy	469
Marking up the metric bill—1973	470
Labor sways the Rules Committee	471
Labor and rightwing opposition to metric system .	472
Labor and small business gang up	474
Defeat in 1974.	474
The Metric Conversion Act of 1975	475
Lloyd plugs for labor bill	477
Symington subcommittee markup	478
Emery fights for 10-year goal	479
Labor pressures renewed	481
Smooth sailing for the metric bill	482
Symington summarizes policy decisions	483
Goldwater and Emery deplore lack of target date .	484
Accepting the Senate metric bill	485
President Carter's policy statement on metric . . .	486
A rose by any other name	487
The Highway Administration gaffe	488
From Fahrenheit to Celsius	489
The committee steps into the breach.	490
The pluses and minuses of 1977	491
Metric Board finally gets underway—1978	492
GAO report raises doubts	494
Teague spells out intent of Congress	494
Support for metric system in 1979	495
Opposition in 1979	496

	<i>Page</i>
XII. SCIENCE, RESEARCH AND TECHNOLOGY, 1970-79	499
Will applied research dilute basic research?	499
NSF funding in 1970	500
Subcommittee in 1971	501
The OMB and applied research	502
Research applied to national needs—RANN	503
Subcommittee decisions in 1971	503
Impoundment of NSF funds in 1971	504
A new director for NSF in 1972	505
Counterattack against impoundment	506
The subcommittee in 1973	507
Funding the NSF in 1973	508
Impoundment battle in the House	508
NSF and the abortion issue	509
Improving oversight over NSF	510
Talking with the OMB	511
The NSF in 1974	511
Geographic distribution of NSF funds	512
Symington becomes subcommittee chairman . . .	513
NSF education progress in 1975	514
Conlan attacks MACOS	515
Geographic distribution in 1975	516
Conlan's strategy	517
Teague and MACOS	518
MACOS debated in full committee meeting . . .	519
The floor fight over MACOS in 1975	520
House narrowly defeats Conlan amendment . . .	522
Peer review	523
The Moudy report on MACOS	524
Conlan and the ISIS program	525
GAO report on ISIS	525
1976 NSF authorization	526
"Silly-sounding" NSF projects	527
Science for citizens program	529
The controversy escalates	530
Who will blink first?	531
Thornton becomes subcommittee chairman in 1977 .	532
Organization meeting of the Thornton subcom- mittee	533
The science for citizens program in 1977	534
Flowers renews fight for wider distribution . . .	536
Floor debate on NSF authorization in 1977 . . .	537
NSF authorization hearings in 1978	538

XII. SCIENCE, RESEARCH AND TECHNOLOGY, 1970-79—Con.	<i>Page</i>
Flowers makes last plea for geographic distribution	539
Floor debate on NSF authorization in 1978	540
Are those NSF grants really so silly?	541
The rationale for basic research	542
The subcommittee in 1979	543
The NSF in 1979	544
Growth in research funding	545
The need for basic research	546
Crazy-sounding grants	546
Department of Education and NSF education programs	547
Basic charter of the National Science Foundation	549
Office of Technology Assessment, 1970-79	549
Los Angeles-San Francisco hearings	550
Symington and the Missouri hearings.	551
A rider to the Legislative Reorganization Act	552
Penetrating questions by Wydler	552
Unanimous committee support for OTA bill	554
Hurry, hurry!	555
Interest in technology assessment mounts	556
Surprise	556
Preparing for the floor debate	557
The Henderson and Brooks amendments	558
OTA bill passes with Brooks amendments.	559
President signs OTA Act	560
Growing pains and personality problems	562
Other OTA problems involve the subcommittee	563
The Teague report	564
Conclusions on OTA	565
Fire research and development	565
Low priority treatment	566
Congressman Steele carries the ball	568
Miller throws a block	568
"America Burning"	569
Expanded fire safety legislation passed in 1974	571
Doubling the authorization	572
Flippo and Hollenbeck urge aggressive action	573
Authorization for fire prevention in 1979	574
Standard Reference Data System	575
Practical applications	575
Oversight of National Bureau of Standards	576
Voluntary standards	577

XII. SCIENCE, RESEARCH AND TECHNOLOGY, 1970-79	Cont'd.	<i>Page</i>
Symington's Bureau of Standards bill		578
NBS oversight hearings in 1977		578
Materials policy research		579
Materials policy handbook		580
Earthquake research and engineering		584
Victory in 1977		585
DNA and genetic engineering		586
Probing at the edges of knowledge		587
Committee discussion in 1971		588
The 1974 and 1976 committee studies		588
Thornton hearings in 1977		590
Considering new legislation on DNA		591
George Brown and guayule		592
The philosopher-politician		593
Overcoming negative objections		594
Successful joint markup session		595
Seeking the formula for compromise		596
Victory!		596
Other subcommittee activities		597
Employment of scientists and engineers		598
Innovation and productivity		599
Intergovernmental science policy		601
Water resources and agriculture		601
XIII. SCIENCE IN THE WHITE HOUSE		605
Bipartisan opposition to scuttling of science machinery		605
Long-range approach of Science Committee		607
A national science policy		607
Basic research and NIRAS		609
Dissemination of scientific information		610
New technological opportunities		611
Committee muffs its chance in 1972		612
The reorganization bombshell		612
Full committee hearings		613
Symington and Goldwater are critical		614
Teague: "What is happening and why?"		615
The low-key approach		616
The congressional role in science policy		617
The 1974 hearings		618
Careful cooperation with the White House		619
The Killian report		620
Green light to draft a bill		621

XIII. SCIENCE IN THE WHITE HOUSE—Continued

	<i>Page</i>
Timing the legislative initiative	622
The deliberate strategy	623
Interest of Ford as Vice President	624
Teague and President Ford	626
Yeager's approach	626
Bad news and good news	627
Rockefeller makes his report	628
The first Teague-Mosher bill	629
Nudging the White House toward action	630
A dramatic spectacular	631
Internal debate in the White House	633
The prospects for legislation in 1975	634
Dr. Stever leads off	635
Drafting a new Teague-Mosher bill	636
The July 30 revised bill	636
Negotiations with the White House	637
McCormack and Brown reservations	638
Full committee markup meeting	639
The House ratifies committee decisions	641
Negotiating with three Senate committees	642
The bill passes the Senate	643
President Ford prods Congress	644
The conference meets on April 1	645
Teague calls on Noah Webster	645
Subsidies to States	646
House adopts conference report	648
President signs the bill on May 11	648
Political brawl over appointment of Dr. Stever	649
President Carter and the 1976 act	651
President Carter's reorganization plan	651
Differences over interpretation of the 1976 act	653
XIV. TASK FORCE AND SUBCOMMITTEE ON ENERGY, 1971-74	655
Representative Richard H. Fulton sponsors energy committee	656
The task force on energy	657
A proposal to Chairman Miller	657
How the task force would operate	659
Enlisting Teague's help	659
Teague urges action	660
Miller consents to the decision	661
Charter for the task force	662
Membership of the task force	662

XIV. TASK FORCE AND SUBCOMMITTEE ON ENERGY, 1971-

74--Continued

	<i>Page</i>
Briefing other committees	663
Staff support for the task force	664
An important visit to Texas	665
Energy hearings by Davis subcommittee	666
Miller initiative on solar energy	667
Final report of task force	668
Teague taps McCormack for subcommittee chair- manship	669
Announcing the decision	670
Energy Subcommittee members	671
The first energy briefings	672
Short-term energy shortages	672
Solar heating and cooling bill	674
The two-track effort	676
McCormack's appraisal of ERDA legislation	677
OMB opposition to solar heating and cooling . . .	678
Enthusiastic support for McCormack bill	679
Teague wins in spite of himself	680
The Senate and the Christmas Tree	680
Teague urges broadening NASA's charter	681
NSF or NASA: Which should be lead agency in solar?	682
A talk with OMB	682
The meaning of "Proof of Concept"	684
Coal-related research	685
The omnibus solar bill	685
Defending jurisdiction over energy	686
"I want to make a deal"	687
The quick compromise with Udall	688
Getting on board for solar energy	689
The geothermal bill	689
"Informal closed meeting"	690
Republican support for geothermal energy	691
Influence of Subcommittee on Energy	692

XV. A NEW NAME AND EXPANDED AUTHORITY FOR THE COM-

MITTEE

	695
Monroney-Madden joint committee	696
The lost opportunity	696
Exodus from the committee	697
How the committee became "nonmajor"	698
Bolling committee hearings	699
Davis and Mosher testimony	700

XV. A NEW NAME AND EXPANDED AUTHORITY FOR THE COMMITTEE Continued

	<i>Page</i>
Teague and McCormack team up	700
McCormack and energy	702
Dr. Seamans supports Science Committee	703
Dr. Sheldon's influence	703
The December 7 working draft	704
Source of the new name: "Science and Technology"	704
Working behind the scenes	705
Swigert mobilizes the troops.	706
How not to eliminate rumors	706
Science Committee recommended as major committee	707
Democratic caucus torpedoes plan	708
Hansen committee recommendations	709
Differences between Hansen and Bolling plans	710
Similarities in Hansen recommendations	711
Teague speaks against minority staff	711
Science Committee wins fight for aviation R. & D	712
Oceanic and atmospheric sciences	713
The vote on the Hansen proposals	713
Summary of reforms	714
The boat trip	714
McCormack advocates one energy subcommittee	715
We'll just take a vote	716
Naming the energy subcommittees	717
Nuclear R. & D. jurisdiction	717
Flowers bids for Fossil and Nuclear in 1977	718
Relation with Armed Services Committee	719
Jurisdictional problems with energy	720
Dale Myers supplies definitions	721
Minority staff	722
Mosher as ranking minority member	723
Swigert and minority staff	724
Bolling recommendations on minority staff.	725
The struggle over appointments	726
Wydler becomes ranking minority member	727
Wydler clashes with Teague	728
Subcommittee chairman's staff	729
Miller opposes caucus rule	730
Republicans attack subcommittee chairman's power	731
Swigert and subcommittee staffing	732
Oversight subcommittee	733

XV. A NEW NAME AND EXPANDED AUTHORITY FOR THE COMMITTEE - Continued	<i>Page</i>
Teague's philosophy of oversight	734
Establishment of SSIO subcommittee	735
Mixed reaction to Dr. Dillaway.	736
Subcommittee on Investigations and Oversight	737
Jim Lloyd as subcommittee chairman	739
Membership and jurisdiction	740
The trip to Mexico	740
Research programs to aid the handicapped	741
Panel on handicapped research	742
The Brown hearings	743
The second panel for the handicapped	745
Additional Teague initiatives	746
Space-age technology to aid elderly and handicapped	747
XVI. AERONAUTICS AND TRANSPORTATION	749
Bipartisan support for aeronautical R. & D.	749
Neil Armstrong and aeronautics.	752
"We are determined that this be done"	753
Increases in 1971	753
Hearings on the CARD study	754
New name for the subcommittee	755
Need for a clarion call of national leadership	756
Hechler bids goodbye	757
Should NASA or FAA pay for retrofitting?	758
Why does the Senate shortchange aeronautics?	759
Wydler and Goldwater make their pitch	760
Subcommittee chairmanship as a shared experience	761
Young scientists and engineers appear in 1973	764
Getting the agencies to coordinate	764
The shotgun marriage	766
Hydrogen as aviation fuel	766
General aviation	767
Who is in charge of noise abatement?	768
Brown and the internal combustion engine.	769
Waiting on ERDA	770
A new subcommittee chairman	771
Organizing the subcommittee	773
Developing future plans	774
R. & D. for the FAA	775
Senate rebuffs annual authorization for FAA	776
A word of caution on jurisdiction	776
Field trips	777

XVI. AERONAUTICS AND TRANSPORTATION—Continued	<i>Page</i>
Ground propulsion R. & D.	778
Dissension rears its ugly head	778
Future of aviation	779
A new name for the subcommittee	780
Members during 95th Congress.	782
Supersonic technology	783
Aircraft sales to foreign countries	784
The heated MLS controversy	784
The controversy diverts the subcommittee.	786
A new outbreak of charges and countercharges	786
The Burton-Goldwater axis	788
Who is the "Clown"?	789
Air traffic control.	789
The first "A" in NASA	791
Charter for the National Weather Service	792
Tom Harkin takes command	794
Automotive R. & D	799
XVII. NO FUEL LIKE AN OLD FOSSIL FUEL	801
Assistance to committee by Office of Technology	
Assessment	801
Fossil Subcommittee members in 1975.	802
Subcommittee chairman's appointees	803
Jurisdiction between subcommittees	804
Compressed public hearings	805
Line-iteming the authorization	806
Natural gas and oil extraction	807
Joint markup on environment and safety	807
Lobbying by Bureau of Mines	808
Full committee markup	809
House debate on ERDA bill in 1975	811
Prelude to Clinch River battle	812
Methanol and coal combustion	813
Outer Continental Shelf R. & D	813
Synthetic fuels incentives	814
Reactions to loan guarantees.	815
McCormack versus Hechler	816
Summary of Hechler and McCormack positions	817
Teague a moderating force in conference	819
Rules Committee action	819
Wall Street Journal attacks loan guarantees	820
Strategy in House debate	821
"Sorry, Bella"	822
House rejects loan guarantees	824

XVII. NO FUEL LIKE AN OLD FOSSIL FUEL—Continued	<i>Page</i>
The defeat of section 102	825
Getting ready for the 1976 fight	826
H.R. 12112 is introduced	827
Ottinger takes over opposition leadership	828
Moving forward on H.R. 12112	829
GAO opposes loan guarantees	831
Time running out on congressional session	833
Teague threatens filibuster	833
Problems with the compromise bill	834
Rules Committee resolution	835
Charges and countercharges	836
Ray Madden and the turkey gobbler	837
Loan guarantees for biomass	839
More support for coal	839
Walter Flowers takes over subcommittee	840
Ad Hoc Committee on Energy	843
Loan guarantees in 1977	846
No loan guarantees for commercialization	847
Oversight by Flowers subcommittee	848
Clean air standards	849
MHD	850
Construction oversight on coal liquefaction	851
Flowers subcommittee influence on appropriations	852
XVIII. SHOOTOUT AT CLINCH RIVER	857
President Carter opposes the CRBR in 1976 campaign	857
A collision course	858
"Clinch River is a dog"	858
Teague leans toward opposition at start	859
The oversight investigation in Europe	861
Strategy and the return flight	862
Flowers leans toward support of the CRBR	862
Brown opposes the CRBR	863
"We poor mortals"	864
No doubt about McCormack's stand	864
I want to see the President	865
"I'm just listening"	866
The Brown amendment	867
Nobody on the fence	867
The CRBR wins a round	868
Why did the CRBR win?	869
Conference committee walks on eggshells	870

XVIII. SHOOTOUT AT CLINCH RIVER—Continued	<i>Page</i>
Lobbying the White House	871
Teague's angry reaction to veto	871
Brown praises veto	872
The CRBR get a supplemental transfusion	873
To breed or not to breed	874
Flowers calls on the President	875
The seeds of compromise	875
The negotiations intensify	878
President promises to visit Oak Ridge	878
"The President is calling"	879
Fuqua urges compromise	880
Congressional critics of the CRBR	881
A fateful meeting with utility representatives	882
To terminate or not to terminate	883
Slugging the referee	883
Roe moves to table	885
Mrs. Lloyd's amendment prevails	886
Arranging a meeting with the President	887
Moving off dead center	887
The split among three camps	888
The summit meeting on June 14	889
July 14—day of decision	890
The stories about a "deal"	892
The 1979 fight over the CRBR	893
The 1979 compromise fails	894
Nuclear research and oversight	895
Nuclear briefings	896
Funding nuclear programs	897
Nuclear waste management	897
McCormack subcommittee in 1979	899
Effects of Three Mile Island	901
XIX. ADVANCED ENERGY TECHNOLOGIES	903
Jurisdiction	904
Areas of emphasis	904
Let's get moving	905
Goldwater cautions fiscal responsibility	906
Who has asked you to go slower?	907
More emphasis on conservation	908
House adds \$50 million for solar energy	909
Needed: More aggressive management	910
ERDA too cautious and leisurely sounding	911
The initiative on electric vehicles	911
Ottinger joins in	912

XIX. ADVANCED ENERGY TECHNOLOGIES	Continued	<i>Page</i>
Snakes under the rocks		913
Federal use of electric vehicles		913
Dynamic leadership by Science Committee		914
President Ford vetoes electric vehicle bill		915
Organizing House to override the veto.		916
Wydler supports President's veto		916
Victory for the committee		917
Solar, geothermal, and conservation increases in 1976		918
The House again ups the ante on solar energy		919
House is bullish on solar energy		920
Thornton and the Energy Extension Service		921
Goldwater fears a massive bureaucracy		923
President Carter signs Thornton bill		923
Automotive Transport R. & D. Act		924
Committee initiative on automotive bill		925
The automotive bill goes to the White House		926
President Ford vetoes automotive bill		926
Congressional initiative and leadership		927
The House overrides, but the Senate sustains veto.		928
President Carter signs the bill in 1978		929
McCormack subcommittee in 1977		929
The three viewpoints on budget figures		931
The solar photovoltaic energy bill		932
The printer was excited		933
Ottinger, the ringleader		934
Another feather in committee's cap		934
Oversight on solar heating and cooling		935
Wydler condemns solarmania		936
Committee increases in 1978		937
Special inquiries by McCormack subcommittee		938
Solar Satellite Power System		939
We don't know who Paul is		940
Flippo carries the ball		941
Ottinger opposes the SSPS		942
The SSPS bill passes House in 1978		943
No commitment for commercialization		944
The 1979 fight over energy jurisdictions		946
The vote on jurisdictions		947
Secretary Schlesinger and the 1979 hearings		947
"What on Earth are you waiting for?"		948
Future prospects for solar energy		948

XIX. ADVANCED ENERGY TECHNOLOGIES—Continued	<i>Page</i>
Solar energy progress in 1979	949
20 percent solar by 2000	950
Pulling the solar pieces together	951
Conservation progress in 1979.	952
Mrs. Carter testifies on the Mall	953
Construction oversight and geothermal energy . .	954
XX. NATURAL RESOURCES AND THE ENVIRONMENT	955
A separate Subcommittee on the Environment . .	957
Environment and safety in ERDA	958
Nuclear and nonnuclear R. & D	959
EPA research and development	959
Let's get the facts	960
Depletion of the Ozone Layer	960
Satisfying Bob Jones on water pollution	961
The threat of radiation and skin cancer	962
Sulfates in the atmosphere	963
Waste disposal polluting the oceans	964
Environmental Research Centers	965
Chronic exposure to low-level pollutants	965
EPA's research priorities	966
EPA suddenly becomes unpopular	967
Solid waste	968
Coordination with Commerce Committee	969
"You guys work out your own problems"	970
The conference committee which didn't formally meet	970
Weather modification	971
Let the rain come from God	971
National climate program	972
Long-range planning	972
Brown appraises the pros and cons	973
Planning for the 95th Congress	974
The new jurisdiction	974
From chaos to confusion	975
Environment and safety in 1977	977
Brown's philosophy	978
Environmental implications of energy plan . . .	979
Coal and nuclear fuel cycle hearings	980
Biomedical research	980
Ocean dumping revisited	981
Victory for the Science Committee	982
Climate research	983

XX. NATURAL RESOURCES AND THE ENVIRONMENT—Continued	<i>Page</i>
Enlisting administration support	984
Gobbledygook	984
Coordination and leadership	985
Science Committee takes the lead	986
Following up to implement the climate bill . . .	987
Ocean pollution bill	988
Pollution and administrative confusion	988
Setting priorities	989
Jurisdictional conflict with Milford subcom- mittee	990
NOAA Organic Act	990
Workshops: An innovative concept	991
EPA authorization in 1978	992
Relation of R. & D. to enforcement	993
Progress in resource recovery	994
Groundwater R. & D	995
Other activities of Brown subcommittee	996
National Conference on Health Care Costs . . .	996
Organization meeting	997
McCormack on Brown's intentions	998
The title is shortened	998
The bidding for chairmanships	999
Ambro chooses natural resources	999
New members of the Natural Resources Subcom- mittee	1001
Other activities	1003
EPILOGUE	1005
Fuqua and the future	1005
An active apprenticeship	1005
Emphasis on substantive issues	1006
Interest in synthetic fuels	1006
Speedy action on Science Committee bills . .	1007
Relations with Appropriations Committee . .	1009
Relations with executive agencies	1010
A new executive director	1010
Mutual trust	1011
General counsel	1011
Summary of chapters	1012
PHOTO CREDITS AND PUBLISHERS' CREDITS . . .	1033
APPENDIX	1035
SOURCE NOTES	1037
SELECTED BIBLIOGRAPHY	1053
INDEX	1057

Introduction

By Charles A. Mosher¹

It is an easy error to assume that all congressional committees are alike. They differ significantly. Each takes insistent pride in its own uniqueness. And in several ways the Committee on Science and Technology is the most interestingly different of all.

At age 20, this is very junior among the standing committees of the U.S. House of Representatives. It was born of an extraordinary House-Senate joint leadership initiative, a determination to maintain American preeminence in science and technology, reacting to the U.S.S.R.'s Sputnik. And throughout its difficult, formative years to its now increasingly complex, still evolving adulthood, this committee has exerted a forceful policy influence and oversight responsibility, a galvanizing role in an unprecedented era of scientific and engineering accomplishment.

Our modern age of tremendously increased Government support for research originated in World War II, rapidly accelerated and expanded in the early years of this committee's influence, the 1960's, and now is in a transitional stage to new directions and dimensions as yet not clearly identified.

Recognizing the historic significance of this great burst of creativity, and also recognizing the Science and Technology Committee's central innovative part in helping guide and shape much of that successful effort, it is appropriate and important that the committee's first 20 years now be recounted fully and accurately. Four distinctly different chairmen, each very creative in his own way, have directed the committee's activities. And it is particularly appropriate that this history was conceived by Chairman Olin E. Teague, whose decisive leadership in a changing period of increasingly larger, varied, more complex committee jurisdiction, included recently added responsibilities for research, development, and demonstration (R.D. & D.) in all the crucially important aspects of energy resources.

Early in 1977, anticipating the decision to publish a history of these 20 years and after conferring informally with other members and staff, Chairman Teague appointed Mrs. Bonnie Seefeldt to begin the necessary research of documents, to conduct a series of interviews and

¹ Ranking Republican member, House Committee on Science and Technology, 1971-77 and executive director of the committee, 1977-79; former Member, U.S. House of Representatives from Ohio, 1961-77.

to develop a basic chronological report of the committee's activities, preparatory to the final manuscript. He also instructed other members of the staff to cooperate in every possible way with Mrs. Seefeldt's efforts. At a meeting of the whole committee on September 20, 1977, Chairman Teague informed its members—most of whom already were aware and cooperating—that he had taken that responsibility, and he requested the advice and assistance of the members. Chairman Fuqua has likewise advocated publication of the history, and the committee members' consensus support for that goal has been evident throughout its preparation.

Who should the author be? One of the chairman's first assignments to me—when I returned to this committee temporarily as staff director in September 1977—was that of proposing the general character, shape, and thrust our history should take, and to identify the best available talent to write it. The latter task proved most difficult, taking more time than expected. While Bonnie Seefeldt continued her background research, for over three months we explored further our options for producing the final product. After a tentative start or two that proved inadequate, we became convinced the final manuscript must be written by one author rather than by several of us collaborating, and it was imperative that the author have a firsthand knowledge of the Congress and its committee process.

I confess to being somewhat hesitant when I first suggested that we try to persuade Ken Hechler to write our history. But in his typically decisive way, Chairman Teague immediately reached for his phone to learn whether our former colleague would consider the task. As we feared, though interested, he was not immediately available. We waited, exploring other options, then returned to Hechler and it finally was our great good fortune to obtain his consent. He began this work on June 30, 1978.

All of us recognize Ken Hechler's superb qualifications. He was by profession a scholar, a product of Swarthmore and Columbia University (A.B., 1935, Ph. D., 1940), long before he became a politician. He had taught successfully political science and history at Columbia, Barnard College, Princeton, and Marshall Universities. He had assisted in the preparation of Franklin Delano Roosevelt's public papers, had held important posts in the Truman administration, including speech-writing for the President and later for Adlai Stevenson, he was experienced as a radio-TV commentator, he had authored successful histories: *The Bridge at Remagen*; *Insurgency: Personalities and Politics of the Taft Era*; and *West Virginia Memories of President Kennedy*. He was first elected as Representative to Congress from West Virginia's Fourth District in 1958, and then in each succeeding election for nine consecutive terms.

Most importantly, in January 1959 as a freshman Congressman, he became one of the original members of this committee, participating very actively throughout all of its first 18 years, as chairman of important subcommittees for 15 of those years.

So why did I first hesitate to suggest Ken Hechler to be our author? First, there was the obvious question, whether one so intimately involved in the committee's history could recount it with sufficient objectivity. Second, there was the fact that Hechler, though always one of the most productive and stimulating of our committee members, exerting genuine leadership qualities, also was at times a stubbornly independent member on occasion provocatively at odds with the committee's decisions. (Example, in the 94th Congress, his ultimately successful opposition to the committee's bill which would have authorized funding by Government-guaranteed loans for private industry to construct large facilities, to demonstrate the feasibility of producing synthetic fuels on a commercial scale.) We enjoyed and respected him even when we disagreed with him; but would the chairman or other members think me facetious in suggesting that he was ideally the one to write our history?

Those doubts were quickly resolved. It indicates the wisdom and vital spirit of Teague's chairmanship that he and other committee members recognized Hechler's qualifications, trusted his judgment and integrity, ignored any old disagreements, and agreed he should write our history. It emphasized the objectivity of this work, our requirement that it not be a superficial puffery job, that the author has solid credentials as an independent critic. It also emphasized the nonpartisanship typical of this committee, that I—a long time Republican member—and a Democrat, Hechler, of independent spirit, were assigned prime responsibilities for the history.

As author, he was promised a free hand in recounting these 20 years. He was instructed only to be as accurate as possible, but to produce far more than a routine chronological report, to deal realistically with substantive issues, personalities, and interesting anecdotes, to tell this committee's story "warts'n'all," to try to identify the actual significance, strengths, and weaknesses of its role and impact during a most vital, changing period of American history. The facts, the emphases, the adjectives, and somewhat colloquial style, all these are Ken Hechler's own responsibility.

He has fulfilled that charge admirably. This is far different and better reading than the ordinary congressional report. Personally I find it more fascinating than I could have hoped, it abounds in meaningful incidents and details of which I was not aware. I have learned much, I have a very valued, better understanding of the inner dynamics and broader influence of our committee's efforts.

I am confident that knowledgeable critics will find this a remarkably honest, absorbing, and significant work. I am confident that I speak for other members, past and present, in expressing enthusiastic appreciation to our longtime colleague for reporting the actualities of our committee's role with such integrity and verve.

Acknowledgments



On my office door is a cartoon depicting a writer being told by a supervisor: "On first reading, Ken, I'd say cut back on the prickling insights and beef up the anecdotes."

In compiling this 20-year account of the origins and activities of the committee, we have been very fortunate to have available the personalized comments and recollections of many of the participants in these dramatic events. This has made it possible to bring the history alive with anecdotal material.

Chairmen Olin E. Teague and Don Fuqua, as well as executive directors Charles A. Mosher and Col. Harold A. Gould have insisted that this history be objective and nonpartisan, maintain professional standards, and pull no punches. Mr. Mosher has been my severest critic, while at the same time supplying numerous useful editorial suggestions and support. At no time has he attempted to change or soften any of my critical judgments on events involving the committee.

Present and former members of the committee and staff, as well as agency officials and observers, have enriched the history through letters and interviews.

The interviews were tape recorded by Bonnie Seefeldt, who also contributed invaluable assistance in research, editing, and helping to organize the final product. In fact, it would have been impossible to complete this work without the careful groundwork and consistently high-caliber input which she provided.

During the summer of 1978, a number of interns helped with the typing and documentary research, including David Orleans, Kathleen Miller, Michael Gentry, Laura Bartlett and F. Marion Harrelson. In the latter stages, valuable typing assistance was received from Kimberley Woodruff. We were also fortunate to draw on staff assistance from Melinda Bradley, Gail Mathias, Peggy Witzel, Julie Fisher, Lillian Trippett, Suzanne Gibson, Carol Rodgers, April Applegate, Mary Bly, Tim Lockett, Mary C. Jatkowski, and Michael C. Helmantoler, as well as advice from Herbert Wadsworth, Jr.

In the early stages of this effort, John L. Swigert, Jr., executive director of the committee, 1973-77, and Gordon L. Harris, former public affairs director of the Kennedy Space Center, were of great help. In supplying needed documentary materials, we are grateful for the cheerful cooperation of Dr. Monte D. Wright, Carrie E. Karegeannes and especially Lee D. Saegesser of the NASA History Office. At the

Library of Congress, Robert T. Ennis, Pat Ayers and their staffs at the Congressional Research Service were unfailingly helpful. Dr. Charles S. Sheldon II was a constant inspiration, and his staff at the Science Policy Research Division made many suggestions.

Others now or formerly with the committee staff furnished useful advice, including Philip B. Yeager, general counsel; Regina A. Davis, chief clerk; Helen Lee Fletcher, former executive secretary. Among those giving us good editorial criticism were Daniel G. Buckley, Dr. John P. Andelin, Jr., Robert C. Ketcham, Dr. J. Thomas Ratchford, Dr. John V. Dugan, Jr., Dr. William G. Wells, Jr., Frank R. Hammill, Jr., James W. "Skip" Spensley, Dr. Thomas R. Kramer, Nancy Mathews, Dr. John D. Holmfeld, Darrell R. Branscome, Dr. Radford Byerly, Jr., Paul Vander Myde, Daniel E. Cassidy, Thomas N. Tate, Gerald E. Jenks, James E. Wilson, Jr., Paul C. Maxwell, Alexis J. Hoskins, Ralph N. Read, James Jensen, David D. Clement, Sherman E. Roodzant, John G. Clements, James H. Turner, Patricia G. Garfinkel, and Anthony Scoville.

I want to express my admiration and appreciation to the dedicated crew at the Government Printing Office, whose professional handiwork is evident in the production of this volume.

We acknowledge with thanks the following individuals whose interviews and letters to Chairman Teague helped immeasurably:

Hon. Carl Albert (Democrat of Oklahoma), former Speaker, U.S. House of Representatives.

Dr. John P. Andelin, Jr., former staff director, Subcommittee on Advanced Energy Technologies and Energy Conservation, Research, Development and Demonstration, Science and Technology Committee.

William A. Anders, astronaut, later Ambassador to Norway.

Former Representative Leslie C. Arends (Republican of Illinois), former member of Select Committee on Astronautics and Space Exploration.

Neil A. Armstrong, astronaut.

Former Representative Wayne N. Aspinall (Democrat of Colorado).

Dr. Allen V. Astin, Director Emeritus, National Bureau of Standards.

Former Representative Perkins Bass (Republican of New Hampshire).

Alan L. Bean, astronaut.

Former Representative Alphonzo Bell (Republican of California).

Former Representative Bob Bergland (Democrat of Minnesota), presently Secretary of Agriculture.

Jules Bergman, ABC News.

Dr. Charles A. Berry, former Director of Medical Research and Operations, Manned Spacecraft Center, NASA, and personal physician for the astronauts.

Dr. Eugene W. Bierly, Head, Division of Atmospheric Sciences, Climate Dynamics Research Section, National Science Foundation.

Karol J. Bobko, astronaut.

Lt. Gen. Frank A. Bogart, retired, former Associate Director, Manned Spacecraft Center, NASA.

Frank Borman, astronaut.

Dr. Edward L. Brady, Associate Director for International Affairs, National Bureau of Standards.

Vance D. Brand, astronaut.

Dr. Lewis M. Branscomb, former Director, National Bureau of Standards.

Dr. Harvey Brooks, former member, National Science Board and former member, President's Science Advisory Committee.

Representative George E. Brown, Jr. (Democrat of California), chairman, Subcommittee on Science, Research and Technology, Science and Technology Committee.

Former Representative J. Edgar Chenoweth (Republican of Colorado).

Dr. Robert S. Cooper, Director, Goddard Space Flight Center, NASA.

Dr. Edgar M. Cortright, former Director, Langley Research Center, NASA.

Former Representative Paul W. Cronin (Republican of Massachusetts).

Dr. Edward C. Creutz, former Assistant Director, National Science Foundation.

Walter Cunningham, astronaut.

Former Representative Emilio Q. Daddario (Democrat of Connecticut).

Former Representative John W. Davis (Democrat of Georgia).

Dr. Bowen Dees, former Associate Director, National Science Foundation.

Joseph Del Riego, former minority staff member, Science and Astronautics Committee.

Former Representative Thomas N. Downing (Democrat of Virginia).

Dr. Lee A. DuBridge, former president, California Institute of Technology.

Charles F. Ducander, former executive director and chief counsel, Science and Astronautics Committee.

Former Representative Marvin L. Esch (Republican of Michigan).

Hon. George J. Feldman, former chief counsel and director, Select Committee on Astronautics and Space Exploration.

George W. Fisher, former administrative assistant to former Representative Olin E. Teague (Democrat of Texas).

Dr. James C. Fletcher, former Administrator, NASA.

Hon. Gerald R. Ford, former President of the United States, and former member of Select Committee on Astronautics and Space Exploration.

Representative Edwin B. Forsythe (Republican of New Jersey).

A. N. Fowler, Acting Division Director, National Science Foundation.

Former Representative Louis Frey, Jr. (Republican of Florida).

Dr. Robert A. Frosch, Administrator, NASA.

Representative Don Fuqua (Democrat of Florida), chairman, Science and Technology Committee.

Arnold W. Frutkin, Associate Administrator for External Relations, NASA.

Charles G. Fullerton, astronaut.

Dr. Robert R. Gilruth, former Director, Johnson Space Center, NASA.

Edward G. Gibson, astronaut.

Dr. T. Keith Glennan, former Administrator, NASA.

Richard F. Gordon, Jr., astronaut.

Col. Harold A. Gould, executive director, Science and Technology Committee.

Dr. Norman Hackerman, Chairman, National Science Board.

Frank R. Hammill, Jr., former counsel, Science and Technology Committee.

Dr. Philip Handler, President, National Academy of Sciences.

Representative Tom Harkin (Democrat of Iowa).

Henry W. Hartsfield, Jr., astronaut.

Dr. Leland J. Haworth, former Director, National Science Foundation.

Former Representative Brooks Hays (Democrat of Arkansas), former member of Select Committee on Astronautics and Space Exploration.

Rev. Theodore M. Hesburgh, president, University of Notre Dame.

Roger W. Heyns, former chancellor, University of California, Berkeley, Calif.

Richard P. Hines, former staff consultant, Select Committee on Astronautics and Space Exploration and Science and Astronautics Committee.

- Dr. John D. Holmfeld, science consultant, Science and Technology Committee.
 Richard E. Horner, former Associate Administrator, NASA.
 Dr. Lloyd G. Humphreys, former Assistant Director for Education, National Science Foundation
 James B. Irwin, astronaut.
 Dr. Leonard Jaffe, former Deputy Associate Administrator, Applications, NASA.
 Former Representative Joseph E. Karth (Democrat of Minnesota).
 Joseph P. Kerwin, astronaut.
 Robert C. Ketcham, counsel, Science and Technology Committee.
 Former Representative David S. King (Democrat of Utah).
 Dr. Christopher C. Kraft, Jr., Director, Johnson Space Center, NASA.
 William B. Lenoir, astronaut.
 Representative Jim Lloyd (Democrat of California).
 Dr. Alan M. Lovelace, Deputy Administrator, NASA.
 James A. Lovell, Jr., astronaut
 Dr. George M. Low, former Acting Administrator, NASA.
 Hon. John W. McCormack (Democrat of Massachusetts), former Speaker, U.S. House of Representatives and chairman, Select Committee on Astronautics and Space Exploration.
 Dr. William D. McElroy, former Director, National Science Foundation.
 Dr. Archibald T. McPherson, former Associate Director, National Bureau of Standards.
 Former Representative Dale Milford (Democrat of Texas).
 Former Representative George P. Miller (Democrat of California), chairman of the Science and Astronautics Committee, 1961-73.
 Edgar D. Mitchell, astronaut.
 Former Representative Charles A. Mosher (Republican of Ohio), former executive director, Science and Technology Committee, and former ranking Republican, Science and Technology Committee.
 Dr. George E. Mueller, former Associate Administrator for Manned Space Flight, NASA.
 Dale D. Myers, former Associate Administrator for Manned Space Flight, NASA.
 Representative William H. Natcher (Democrat of Kentucky), former member of Select Committee on Astronautics and Space Exploration.
 Dr. John E. Naugle, chief scientist, NASA.
 Dr. William A. Nierenberg, director, Scripps Institution of Oceanography, University of California, San Diego.
 Former Representative Leo W. O'Brien (Democrat of New York), former member of Select Committee on Astronautics and Space Exploration.
 Brian O'Leary, astronaut.
 Dr. T. B. Owen, former Assistant Director, National Science Foundation.
 Dr. Lowell J. Paige, former Acting Deputy Director, National Science Foundation.
 Donald H. Peterson, astronaut
 Dr. Rocco A. Petrone, former Associate Administrator, NASA.
 Dr. E. R. Piore, former member, President's Science Advisory Committee and National Science Board.
 Dr. Frank Press, Director, President's Office of Science and Technology Policy.
 Former Representative Bob Price (Republican of Texas).
 Dr. J. Thomas Ratchford, former staff director, Subcommittee on Energy Research, Development and Demonstration, Science and Technology Committee.

Former Representative Richard L. Roudebush (Republican of Indiana).

Former Representative J. Edward Roush (Democrat of Indiana).

Representative James H. Scheuer (Democrat of New York), former chairman, Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation, Science and Technology Committee.

Russell L. Schweickart, astronaut.

Dr. Robert C. Seamans, Jr., former Deputy Administrator, NASA.

Dr. Charles S. Sheldon II, former assistant director, Select Committee on Astronautics and Space Exploration and technical director, Science and Astronautics Committee.

Donald K. "Deke" Slayton, astronaut.

Philip M. Smith, Assistant Director, President's Office of Science and Technology Policy.

Former Representative Neil Staebler (Democrat of Michigan).

Lt. Gen. Thomas P. Stafford, astronaut.

Dr. H. Guyford Stever, former Director, National Science Foundation.

Richard H. Sullivan, former member, National Science Board.

Former Representative James W. Symington (Democrat of Missouri).

Thomas N. Tate, counsel, Subcommittee on Space Science and Applications, Science and Technology Committee.

Former Representative Olin E. Teague (Democrat of Texas), former chairman, Science and Technology Committee, 1973-79

Former Representative Ray Thornton (Democrat of Arkansas).

Representative Wes Watkins (Democrat of Oklahoma).

James E. Webb, former Administrator, NASA.

Paul J. Weitz, astronaut.

Dr. William G. Wells, Jr., staff director, Subcommittee on Science, Research and Technology, Science and Technology Committee.

Dr. Edward C. Welsh, former executive secretary, National Aeronautics and Space Council.

James E. Wilson, Jr., former staff director, Subcommittee on Space Science and Applications, Science and Technology Committee.

Representative Larry Winn, Jr. (Republican of Kansas).

Theodore W. Wirths, Director, Office of Small Business Research and Development, National Science Foundation.

Representative John W. Wydler (Republican of New York), ranking Republican member, Science and Technology Committee, 1977-

Philip B. Yeager, general counsel, Science and Technology Committee.

References have been included in the text and "Source Notes" are listed on pages 1037-1051, preserving continuity for the general reader. Full access to the voluminous official and personal correspondence files of the committee and its present and former members greatly enhanced the value of the finished product.

To avoid confusing those who are not "insiders," I have, throughout, simplified the dates of fiscal year funding to relate to activities the year they actually took place. This means that the story of what was done in 1979 will actually refer to 1979, instead of "fiscal 1980," for example.

A simple glossary would probably help readers unacquainted with the strange folkways of Congress, but if you assume everyone is a Rip van Winkle the glossary would sound condescending. So I'll just confine myself to the two questions most frequently asked me: What is a conference committee; and what is a "markup"? When the House and Senate pass a bill in different form, a conference committee including the senior House and Senate Members from the committees having jurisdiction over the legislation get together to agree on a compromise version, which is then submitted to the House and Senate for approval. A "markup" is simply a meeting of committee or subcommittee members, usually following public hearings, to amend or mark up a bill in order to move it toward final action by the House or Senate.

The deeper I delved into this subject, the bigger the job grew. It could only be accomplished by compressing several years' effort into one year, giving up evenings, weekends, and holidays, by working longer and harder in order to comprehend the totality of the multi-dimensional edifice being constructed. To measure the full impact of an important congressional committee on public policy, amid the triumphs and the tragedies, the occasional human foibles more than matched by dedicated effort and foresight, was a genuine challenge.

The memory of mankind is short. Congressional committees, with their frequent turnover of personnel, have even shorter institutional memories. To capture and record, and search for the true significance of what an important arm of the Congress has accomplished has been the aim of this work. It will be for others to judge whether that aim has been realized.

I have personally enjoyed the opportunity to reconstruct the events of the past 20 years. Despite the care with which a number of individuals have read the manuscript, I take full responsibility for both the personal judgments which have been made and the errors which have crept in.

KEN HECHLER.

In the Beginning, the Select Committee

The House Committee on Science and Technology had its roots in the American public's intense reaction to the Soviet launch of Sputnik, the first satellite to orbit the Earth, on October 4, 1957.

The committee was originally named the "House Committee on Science and Astronautics," which first saw the light of day on January 3, 1959. That was a unique event, because it was the first standing committee of the House to be born since the Legislative Reorganization Act of 1946 had drastically reduced the number of standing committees from 48 to 19. Even more significant, it was the first time since 1892 (when the predecessors of the House and Senate Interior and Insular Affairs Committees had been established) that both the House and Senate had moved to create standing committees on an entirely new subject matter. And, as we shall see, the House committee enjoyed a considerably broader jurisdiction than its counterpart in the Senate.

The 20-year history of the committee traces back to a landmark action of the Congress in 1958.

Scarcely five minutes after the House of Representatives convened on Wednesday, March 5, 1958, and before many Members had reached the floor, Speaker of the House Sam Rayburn crisply but gruffly intoned:

The Chair recognizes the gentleman from Massachusetts.

House Majority Leader John W. McCormack had a real sense of the deep significance of the moment, but his words were simple:

Mr. Speaker, I offer a resolution and ask unanimous consent for its present consideration.

If McCormack sounded matter-of-fact, the actual reading of the resolution was delivered in booming and stentorian tones by House Reading Clerk George Maurer. The Members on the floor stopped their conversations and when Maurer read House Resolution 496, it seemed to take on deeper meaning as each word was emphasized:

Resolved, That there is hereby created a Select Committee on Astronautics and Space Exploration to be composed of 13 Members of the House of Representatives to be appointed by the Speaker, 7 from the majority party and 6 from the minority party, one of whom he shall designate as chairman.

The charter of the select committee was simply and directly stated:

The select committee is authorized and directed to conduct a thorough and complete study and investigation with respect to all aspects and problems relating to the exploration of outer space and the control, development, and use of astronomical resources, personnel, equipment, and facilities.

Once the reading of the brief resolution was finished, it passed unanimously after only one very brief exchange. Republican leader and former Speaker Joseph W. Martin, Jr., who was subsequently appointed vice chairman of the select committee, asked and received an affirmative answer to only one question: Whether the new committee was generally similar in nature to the Senate committee.

The creation of the select committee was the most important single action by the Congress leading to the establishment of the House Committee on Science and Astronautics and the present Committee on Science and Technology.

In designating Majority Leader McCormack as the chairman of the select committee, Speaker Rayburn made one of his wisest decisions. Spurred by McCormack's imaginative leadership, the new committee immediately plunged into a comprehensive series of public hearings which laid the foundation for the Nation's space policy.

ACCOMPLISHMENTS OF THE SELECT COMMITTEE

During the spring and summer of 1958, the select committee worked at a frantic pace. Three important goals were achieved:

- (1) Chartering the permanent House Committee on Science and Astronautics, with an expanded jurisdiction covering science as well as space;

- (2) The writing of the Space Act, setting up the National Aeronautics and Space Administration; and

- (3) Landmark hearings and special committee reports which helped shape the course of the Nation's space program in the crucial year of 1958.

WHAT LED TO THE CREATION OF THE SELECT COMMITTEE?

In 1958, the Congress seized the initiative. The legislative branch, the people's sounding board, responded quickly and decisively. Meanwhile, the executive branch was divided and sounded an uncertain trumpet.

The beep-beep of the Soviet Sputnik I, launched on October 4, 1957, sent shockwaves through the American public. Surprise, fear, humiliation, and anger were intensified less than a month later when

Sputnik II went into orbit with the space dog Laika. How could those ignorant Bolshevik peasants surpass good old American technological know-how? How could they manage to orbit a 184-pound payload, and then follow with the smooth orbiting of a 1,120-pound payload? How did the Russian scientists and engineers overtake us? These questions were on the lips of Congressmen, officials in charge of our missile and satellite programs, and other national leaders. But even more important, the questions were repeated throughout the land by people high and low who were deeply disturbed.

The prairie fire of demands for action swept across the Nation. The clamor rose to a roar. The American people could sense the serious blow to American prestige around the world. The feeling ran deeper than who could put the biggest payload into orbit. There was a widespread uneasiness about our educational system and why we weren't turning out the scientific and engineering talent to meet the Soviet challenge. Fear of Soviet space missiles gripped the Nation.

The House and Senate leadership showed they were much more in tune with public thinking than a seemingly indecisive executive branch. Speaker Rayburn and his majority leader had early and positive reactions. "When Sputnik went up, naturally we discussed it," recalled John McCormack. "And I knew we were not going to meet the challenge that Sputnik presented to us by just talking. We had to act—we had to act ourselves in the field of outer space. * * * Sam realized the importance of it and he said: 'Well, you'll have to be chairman.' I said, 'All right, Sam I will.' "

The second-ranking member of the House Armed Services Committee, Representative Overton Brooks, of Louisiana, was in Paris when the startling news of Sputnik first broke. His staff assistant, Charles Ducander, recalls:

I'll never forget that we were staying at the George Cinq and we came out of the hotel and bought an American language newspaper—I guess it was the old Herald-Tribune, Paris edition—and here on the front page is the headline—Russia had orbited a satellite. Well, Brooks about jumped out of his skin. He could talk of nothing else. As a matter of fact, we came home two days early. He said: "The first thing I'm going to do when Congress goes back in session is to drop in a bill to form a special committee because we have to catch up with them or surpass them."

Brooks, who in 1959 was tapped to be the first chairman of the standing committee (the House Committee on Science and Astronautics), didn't wait for Congress to convene in 1958 before he stuck in his oar on space policy. The New York Times on October 16, 1957—less than two weeks after Sputnik I—quoted Brooks as calling on the President to appoint a czar over America's missile and satellite program.

MEANWHILE AT THE WHITE HOUSE

The reaction of the executive branch was confusing to the general public. President Eisenhower was asked at his October 9 news conference: "Are you saying at this time that with the Russian satellite whirling about the world, you are not overly concerned about our Nation's security?" In his widely quoted response, the President commented: "Now, so far as the satellite itself is concerned, that does not raise my apprehensions, not one iota." Unfortunately, the President had become convinced that the crisis was partially a propaganda and public relations problem. In later years, in his book *Waging Peace*, President Eisenhower wrote that his short-term problem following Sputnik "was to find ways of affording perspective to our people and so relieve the current wave of near hysteria."

At the same time, President Eisenhower renewed the scientific commitment of the United States to the cooperative multinational program called the International Geophysical Year, which included the development of an Earth satellite by the United States. The President called in a number of scientists for personal consultation, delivered two nationwide addresses on science and defense and on November 7, 1957, appointed James R. Killian, Jr. as Special Assistant to the President for Science and Technology. The President's Science Advisory Committee, which had been placed within the Office of Defense Mobilization, was reconstituted and transferred to the White House on December 1, 1957. In a nationwide radio address, President Eisenhower stressed the need for expanding support of science education at all levels of Government.

While Members of Congress were calling for action, and the public was getting frustrated and infuriated by the "Papa-Knows-Best" advice, there were scores of patriotic men of vision and principle who risked their positions within the Government or military hierarchy by speaking out boldly to define the crisis facing the Nation. People like German-born rocket expert Dr. Wernher von Braun, working at the Army's Ballistic Missile Agency in Huntsville, Ala.; Trevor Gardner, Assistant Secretary of the Air Force in charge of Research and Development; and Lt. Gen. James M. Gavin, Deputy Chief of Staff of the Army in charge of Research and Development—and many others were working effectively as well as sounding the alarm bells in the night.

President Eisenhower suffered from some incredible gaffes by his own staff and official family. The press and the Democrats, of course, seized on and magnified these mistakes, all of which helped sharpen the contrast between what appeared to be a timid executive branch and a forcefully articulate Congress which was seizing the initiative. Outgoing Secretary of Defense Charles Wilson ridiculed Sputnik as a

"neat scientific trick"; Wilson added that "nobody is going to drop anything down on you from a satellite while you're asleep, so don't worry about it." Another high administration official, Clarence E. Randall, characterized Sputnik as "a silly bauble," and Presidential Chief of Staff Sherman Adams joked about the "outerspace basketball game." When he wrote his memoirs, *Firsthand Report*, Adams conceded that "Eisenhower said he preferred to play down the whole thing. * * * I was only trying to reflect the President's desire for calm poise."

Despite the frenzied flurry of activity at the working levels of Government, the public gained the distinct impression that Congress was the only branch of Government which had the correct sense of urgency. When the Soviets lofted their second Sputnik in November, The New York Times carried an account the tone of which was duplicated throughout the Nation:

The White House said today that the new Soviet satellite was "no surprise" as it fell "within the pattern of what was anticipated."

Mrs. Ann Wheaton, Assistant Press Secretary at the White House, said the President had received considerable information in advance on expected Soviet achievements

Members of Congress, however, increased their clamor for an investigation of the U.S. missile and satellite program

THE JOHNSON COMMITTEE HEARINGS AND VANGUARD

The boldest, most positive reaction on Capitol Hill came from Senate Majority Leader Lyndon B. Johnson. The Preparedness Investigating Subcommittee of the Senate Armed Services Committee on November 25, 1957, started what turned out to be voluminous hearings on the Nation's satellite and missile programs. A future Secretary of State, Cyrus Vance, was assistant counsel of the investigating subcommittee, which helped dramatize the initiative of the Congress to meet the crisis. One of the recommendations of the Johnson subcommittee was to "start work at once on the development of a rocket motor with a million-pound thrust."

While the Johnson hearings were going on, America was plunged into deeper gloom as the eyes of the world were focused on the spectacular failure of the first attempt by the United States to orbit a satellite. The Navy's Vanguard, with a payload of less than 4 pounds, made a pitiful effort to get off the ground, but blew up on the launching pad on December 6, 1957. The December 7 headlines made it awesomely clear that America had suffered another Pearl Harbor for science and technology.

"This administration does not appreciate the urgency of the situation," proclaimed Majority Leader McCormack. Speaker Rayburn

stated that we must "put our scientists and engineers to work." At a December White House briefing of congressional leaders, the press reported that "almost to a man, the leaders came from the meeting in a critical mood. The lack of a 'sense of urgency' in the administration was the main complaint."

On the eve of the meeting of the new session of Congress in January 1958, Robert Albright wrote in the *Washington Post*:

Sputnik and the battle for survival implicit in the Soviet satellite-missile advances will in all likelihood dominate the second session of the 85th Congress convening Thursday

EXPLORER I

At the Army Ballistic Missile Agency in Huntsville, Ala., a team of scientists and engineers led by Dr. Wernher von Braun scored a dramatic triumph with the launch of Explorer I on January 31, 1958, from Cape Canaveral, Fla. The Army was jubilant. Despite the fact that the satellite weighed only a little over 30 pounds, von Braun immediately became a hero and a prophet. If anything, the great event underlined the drama of the space race and furnished still another spur toward action by the Congress.

At the same time, the Army's victory helped fan the fires of intense and bitter competition among the three services attempting to get, hold and expand their pieces of the space and missile action. The strong interservice rivalry was not stilled by President Eisenhower's appointment, early in 1958, of Roy Johnson, a General Electric Co. vice president, as head of the newly created Advanced Research Projects Agency in the Department of Defense.

ESTABLISHMENT OF THE SELECT COMMITTEE

Although the Senate voted on February 6 to establish a Special Committee on Space and Astronautics, with Senator Johnson as chairman, the Senate committee was not very active during its early days. Representative William H. Natcher (Democrat of Kentucky) noted in his journal on March 4, 1958, that almost all of the Senate Space Committee members were committee chairmen or their ranking Republican counterparts. "When the announcement was made of the Senate members of the committee, I in turn tried to figure out in my own mind just who the Speaker would appoint on the House committee," he wrote. "It never occurred to me that I would be named as one of the 13 members of the House committee, since my seniority was not comparable."

Speaker Rayburn explained to Natcher, who had only been elected in 1953, that he wanted active members who would represent all sections of the country as well as the different committees with related jurisdictions.

When the House select committee was officially established on March 5, Speaker Rayburn, Majority Leader (and future Speaker) McCormack and Minority Leader (and former Speaker) Martin—who always worked very closely together— all agreed that membership of the new group must include a “blue ribbon” selection of some of the best and most conscientious members from both sides of the aisle.

MEMBERSHIP OF THE SELECT COMMITTEE (1958)

The 13-member committee included the following, in order of seniority:

Democrats

John W. McCormack, Massachusetts,
Chairman
 Overton Brooks, Louisiana
 Brooks Hays, Arkansas
 Leo W. O'Brien, New York
 Lee Metcalf, Montana
 William H. Natcher, Kentucky
 B. F. Sisk, California

Republicans

Joseph W. Martin, Jr., Massachusetts
 Leslie C. Arends, Illinois
 Gordon L. McDonough, California
 James G. Fulton, Pennsylvania
 Kenneth B. Keating, New York
 Gerald R. Ford, Jr., Michigan

The personnel of the select committee reflected Speaker Rayburn's decision that this was a top-caliber committee which should include key representatives of major standing committees. Serving in addition to the majority and minority leaders there were also the top-ranking Democratic and Republican members of the Armed Services Committee (Brooks and Arends), the top-ranking Republican member of the Judiciary Committee (Keating), and key members of the Committee on Appropriations (Natcher and Ford), Interstate and Foreign Commerce (O'Brien), Foreign Affairs (Hays and Fulton), Education and Labor (Metcalf), Interior and Insular Affairs (Metcalf, O'Brien, and Sisk), and Banking and Currency and Joint Committee on Defense Production (McDonough).

Fulton, a free-wheeling millionaire lawyer from Pittsburgh, could always be counted on to spark and spice the public hearings with his offbeat manner of presenting startling ideas. Confronting Dr. Wernher von Braun on the opening day of the committee's hearings, Fulton blurted out:

Why do we not try to ask the President to give you that power to take a crack at the Moon even though you do not hit it? Would you like that?

Or, to a witness describing the Navy's Vanguard satellite:

If you took one light year, that would be six trillion miles, and if the nearest star is 26 trillion miles away, the distance our satellite that you put up will go in 200 years is inconsequential, being only $3\frac{1}{2}$ billion miles.

Fulton also had the distinction of being the first Congressman to introduce a resolution calling for a standing space committee. Fulton's

interest even predated Sputnik, for on August 29, 1957, Fulton dropped in a resolution "To establish a joint committee on Earth satellites and the problems of outer space." He reintroduced the resolution on January 9, 1958.

THE HIGH HOPES OF OVERTON BROOKS

Brooks, who next to Chairman McCormack proved to be the most active member of the select committee, had high hopes that he rather than McCormack would become chairman of the new committee. As second-ranking member of the House Armed Services Committee, Brooks was constantly in the shadow of the Chairman, Carl Vinson, who ruled his committee with an iron hand. Brooks was an ambitious man who wanted to advance to be Governor of Louisiana or perhaps U.S. Senator, and to do so he wanted and needed publicity in the Shreveport and other Louisiana papers. Brooks was frustrated that Chairman Vinson was the center of attention, always in the spotlight. Vinson, who thoroughly mastered every detail and always did his homework, did not have a very high regard for Brooks and shuddered at the thought that he was in line to be Armed Services chairman after Vinson retired or passed on.

With a nose for publicity, Brooks saw an opportunity to ride the tremendous public interest in space. He dropped in two resolutions—one to create a joint committee on space, and one to set up a House "Special Committee on Astronautics and Space Exploration," thus hoping to be named chairman of the new body. Speaker Rayburn wanted a strong chairman to match Senate Majority Leader Johnson. Therefore, although Brooks had introduced House Resolution 474 on February 10, and McCormack's Resolution 496 did not see the light of day until March 5, it was McCormack's resolution which was taken up in the House. As a matter of fact, the McCormack resolution breezed through the House without so much as touching base with the Committee on Rules, where the Brooks resolution had languished untouched since February 10.

Brooks was miffed, but like a good soldier he told the House:

It has been decided best not to take up my resolution, but rather to put support behind the present resolution. I am therefore supporting the present resolution with all of the enthusiasm I can command

Despite his disappointment at failing to be named chairman of the select committee, Brooks showed a clear understanding of the nature and purpose of the committee. He also was one of the earliest to speak out for "the need for scientific education," which he stressed during the debate on the McCormack resolution.

FUTURE PRESIDENT JOINS SELECT COMMITTEE

A 5th-term member from Michigan, Gerald R. Ford, Jr., was named to the select committee as the lowest ranking Republican. Ford blossomed into an active member, both in the hearings and in the executive sessions which involved drafting the new NASA legislation.

As Ford recalls it,

I had lots of experience in the Defense Appropriations Subcommittee, and at that time virtually all of the funding for space, missiles, etc., came out of the Defense Appropriations.

When it came time to name the conference committee on the Space Act, Ford was included, although lower in seniority than both Martin and Arends.

Chairman McCormack recruited a small but highly competent staff for the select committee. Heading the staff as chief counsel and director was George J. Feldman, a New York attorney and close personal friend of McCormack, who had cut his legislative eyeteeth with Massachusetts Senator David I. Walsh, and later served as Ambassador to Malta and Luxembourg. From the Legislative Reference Service of the Library of Congress came Dr. Charles S. Sheldon II, who served as assistant director, and Spencer Beresford, special counsel. The regular staff was rounded out by Richard P. Hines, Raymond Wilcove, Harney S. Bogan, Jr., and Philip B. Yeager, who served as a special consultant.

HEARINGS BEFORE THE SELECT COMMITTEE

Shortly after he decided to appoint George J. Feldman as chief counsel and director of the select committee, Chairman McCormack sat down in his office one Saturday morning and scratched out on lined, note-pad paper a personal note which he dropped in the mail to Feldman in New York. In addition to advice on people he wanted Feldman to interview, McCormack wound up the handwritten set of instructions with these important words:

Frankly, I would like to get the jump on the Senate Committee, so our Committee might in the public mind be the leader and not the follower.

Chairman McCormack organized a stellar series of witnesses to appear before the select committee. In addition, he scheduled morning, afternoon, and occasional evening sessions to help meet the challenge of the rapidly developing scientific subject matter necessary for the committee to cover. Some of the Nation's greatest scientists, rocket engineers, military leaders, and administrators were summoned to explore the nature of the major problems faced.

When the committee was not yet three weeks old, the first witness was called on March 20: Allen W. Dulles, Director of the Central Intelligence Agency. The CIA operatives startled the committee by coming up several days in advance of the briefing to "de-bug" the small room in the Capitol where the session was to be held. According to George Feldman, Dulles read a long statement but declined to leave a copy of the statement with the committee because of its classified nature. Although Feldman noted there wasn't anything in the statement that had not already appeared in the newspapers, a partisan argument quickly flared up between the Democrats who insisted they wanted a copy and the Republicans who defended Dulles' refusal. Finally, Chairman McCormack, on the advice of Feldman, quieted the furor by suggesting that any member who wanted to do so could go down to the CIA and look at a copy.

During a discussion before the full committee in 1959, Chairman Brooks mentioned: "We have plans to have the CIA appear in executive session." McCormack countered: "If you get as much out of them as the select committee got out of them, you won't know any more than you do at this time."

In the public hearings through May 12, the hearing record constituted 1,542 pages. Led by Dr. Wernher von Braun, the witnesses included top rocketry and scientific talent in the three military services, on duty and retired, including Rear Adm. Hyman G. Rickover, Maj. Gen. Bernard A. Schriever, Lt. Gen. James M. Gavin, Maj. Gen. John B. Medaris, Rear Adm. John T. Hayward, Brig. Gen. H. A. Boushey, and Dr. Herbert F. York. From the National Advisory Committee for Aeronautics came its Chairman and Director, Drs. James H. Doolittle and Hugh L. Dryden. From the academic world came Dr. Lee A. DuBridge, president of the California Institute of Technology, and Dr. James A. Van Allen of the University of Iowa. Among those testifying from private industry were Kent T. Keller, former president of Chrysler Corp., Dr. Walter S. Dornberger of Bell Aircraft Corp., and Krafft Ehrlicke of Convair. In addition, representatives and leaders of the National Science Foundation, Weather Bureau, Department of State, and other Federal agencies testified.

All the witnesses discovered that the committee members had done their homework thoroughly, as a result of which they found that most committee meetings extended far beyond their allotted time in probing questions. Aside from the brief flareup during the Dulles hearing, there was a remarkable degree of bipartisanship shown in both the sessions and the reports developed by the committee. A strong partisan Democrat as majority leader, McCormack ran the select committee with a conscious effort to weld a unity of approach. He successfully achieved this aim.

On April 16, Dr. Hugh L. Dryden appeared before the committee, armed with impressive credentials as the Director of the National Advisory Committee for Aeronautics. Dr. Dryden, whose NACA was merged into the new NASA, was everybody's logical choice to head the new space agency up to the time he stumbled before the select committee. In response to a question about manned space flight, Dr. Dryden made the offhand comment that "tossing a man up in the air and letting him come back" had about the same technical value as the circus stunt of shooting a young lady out of a cannon. The remark received wide press coverage, and as a result Chairman McCormack, Representative Fulton, and most members of the committee immediately became disenchanted with Dryden and informed the White House they opposed his appointment as head of the new space agency.

When Dr. Dryden returned to the committee on April 22, Chairman McCormack reminded him of his circus cannon statement and asked:

Do you want to amplify that, or clarify it, or explain it, or anything you want?

In response, Dr. Dryden pretty well stuck to his original position, summarizing:

My statement was not directed in criticism of any specific program, but was intended to illustrate the wide variety of simple experiments, which give you little information, to much more complicated and costly experiments which give you a great deal more information.

Chairman McCormack generally voiced the conclusions of the select committee members when he observed:

Some people thought, assuming an agency were established and you were appointed the Director, the head of it, that it might indicate the state of your mind on your part where you are more wedded to the past activities of your organization than the future activities.

Dr. Dryden, who subsequently served as Deputy Administrator under NASA's first two Administrators, T. Keith Glennan and James E. Webb, also did not endear himself to the select committee by the tone of his testimony on August 1, 1958, during consideration of a construction authorization for NASA. The exchanges developed as follows:

Mr. FULTON. You would say this program is no attempt to leapfrog the Soviets' plans to get ahead of them?

Dr. DRYDEN. In all honesty, I would have to say that the prospective space programs are not such as to leapfrog the Soviets immediately, or very soon.

Mr. FULTON. Thank you.

Mr. BROOKS. Is this an attempt to catch up with the Soviets' program?

Dr. DRYDEN. This is an attempt to establish a national program for the United States. It starts at a beginning which I think is adequate. It most decidedly is not a crash program to catch up with anybody.



Members of the Select Committee on Astronautics and Space Exploration prepare to hear testimony by Dr. Hugh L. Dryden on April 16, 1958. Model of the Echo communications satellite is in background.

Seated at table, left to right: George J. Feldman, chief counsel and director of the select committee; Dr. Dryden (later Deputy Administrator of NASA); Representative John W. McCormack (Democrat of Massachusetts), chairman of the select committee.

Standing, from left: Representatives William H. Natcher (Democrat of Kentucky), James G. Fulton (Republican of Pennsylvania), Lee Metcalf (Democrat of Montana), B. F. Sisk (Democrat of California), Gordon L. McDonough (Republican of California), Leo W. O'Brien (Democrat of New York), Representative Kenneth B. Keating (Republican of New York), and Gerald R. Ferd, Jr. (Republican of Michigan). Those select committee members not included in the photo were Representatives Overton Brooks (Democrat of Louisiana), Brooks Hays (Democrat of Arkansas), Joseph W. Martin, Jr. (Republican of Massachusetts), and Leslie C. Arends (Republican of Illinois).

Mr. BROOKS. As I understand it, you mean this is not in any sense competitive with the Soviet program and as you make advances you do not check the advances as against the Soviet program?

Dr. DRYDEN. I would say that this program is not at a level at which we could guarantee to do that; that is correct.

Many other witnesses, including von Braun, Dornberger, General Gavin, Admiral Rickover, and General Boushey, strongly supported the need for manned flight in their testimony before the select committee. General Boushey (Deputy Director of Air Force Research and Development) told the select committee:

Another function which I believe only man can perform effectively is that of interception and mid-space rendezvous. At first, such missions probably would be for the purpose of refueling, thus permitting a manned, maneuvering space vehicle to receive fuel from an uninhabited tanker satellite which might have been circling in orbit for months or years. Eventually the capability to control space would be augmented by the ability of manned military spacecraft to make interception or rendezvous in space.

Chairman McCormack assigned a subcommittee headed by Representative Natcher to examine the issue of unidentified flying objects. At this point, the select committee was not in a position to verify or examine in depth the numerous UFO sightings, but was interested in a briefing of what the Air Force had uncovered in its compilation and analysis of the subject. According to Representative Natcher, "We borrowed Les Arends' minority whip office in the Capitol, hung a little sign on the door reading 'Subcommittee on Upper Atmospheric Phenomena,' and as a result we could conduct our hearing without any outside fuss or interference from anybody."

The select committee hearings were very thorough, developed logically, were well organized, the attendance by members was unusually high, press and public interest was great, and the witnesses were drawn from a wide cross section of knowledgeable leaders in the scientific world, military, the Government, and private industry. Chairman McCormack was clearly the dominant force in leading the questioning in the hearings, and in maintaining the high level of interest which was displayed throughout.

BIRTH OF THE HOUSE COMMITTEE ON SCIENCE AND ASTRONAUTICS

The leadership and jurisdiction of the House Committee on Science and Astronautics developed from a fascinating interplay among congressional personalities and the demands of the times. By the summer of 1958, the Nation had come to the sobering realization that the threat to the United States ran far deeper than a mere space race with the Soviet Union. At stake was a serious challenge to American education, basic research, the training of scientists and engineers, and the

entire spectrum of support for the development of science and technology. Soviet mastery of space loomed as a military threat.

The House Committee on Science and Astronautics was authorized by House Resolution 580 on July 21, 1958. The birthday of the Senate Committee on Aeronautical and Space Sciences did not occur until three days later on July 24, 1958. More significant was the fact that the jurisdiction of the House committee was markedly broader than that of the Senate committee.

The jurisdiction of the Senate Committee on Aeronautical and Space Sciences was stipulated as follows:

Aeronautical and space activities, as that term is defined in the National Aeronautics and Space Act of 1958, except those which are peculiar to or primarily associated with the development of weapons systems or military operations.

Matters relating generally to the scientific aspects of such aeronautical and space activities, except those which are peculiar to or primarily associated with the development of weapons systems or military operations.

National Aeronautics and Space Administration.

Meanwhile, the House of Representatives voted to give the new House Committee on Science and Astronautics the following broader charter of jurisdiction:

Astronautical research and development, including resources, personnel, equipment, and facilities.

Bureau of Standards, standardization of weights and measures, and the metric system.

National Aeronautics and Space Administration.

National Aeronautics and Space Council.

National Science Foundation.

Outer space, including exploration and control thereof.

Science scholarships.

Scientific research and development.

The broader jurisdiction of the House committee, as well as the issue of who should chair the new committee, developed primarily because of personality issues. House Majority Whip Carl Albert of Oklahoma, small in stature but brilliant in rhetoric and legislative craftsmanship, was the author and prime mover behind House Resolution 580 which created the new committee.

"They talked about making me chairman of the committee," Albert recalled. "And John McCormack wanted me to be chairman."

McCormack had another interest which had become stronger over the years—that there should be a Department of Science of Cabinet rank. This deep interest manifested itself during the complex maneuvering over the chairmanship and jurisdiction of the new standing committee.

In addition, McCormack observed:

I wanted to create a committee that had strength, because I pictured in my own mind the importance of science in the world of tomorrow. * * * I wanted a committee

that had teeth in it, that covered the entire field. * * * I wanted to have a committee that had some power where Members would want to get on, seek the committee assignment because of the challenge it meant to them, as legislators and in connection with the national interest of our country and the world of tomorrow. * * * I considered it one of the most important committees of the Congress.

The catalyst was Carl Vinson, the powerful chairman of the Armed Services Committee. Vinson, as has been noted, looked down his nose at Brooks and was adamant that Brooks, the ranking Democrat on the Armed Services Committee, should never succeed him as chairman of that committee.

According to Carl Albert,

Carl Vinson came over to see Rayburn and they called me over and said: "Listen, we don't want Overton Brooks ever to be chairman of the Armed Services Committee. * * * He's a troublemaker, a griper, and a groucher and (Paul) Kilday is steady and solid and knows the business and he should be the next chairman of the Committee on Armed Services."

Turning to Carl Albert, Speaker Rayburn confided:

We would give you the committee were it not for that fact, but that is an overriding factor. [Ironically, Brooks died in 1961, Vinson stayed on as Armed Services Committee chairman for over three years following Brooks' death, and Vinson celebrated his 96th birthday on November 18, 1979.]

Now came the problem of how to insure that Brooks would be forced to relinquish his post on the Armed Services Committee. It became necessary to broaden the jurisdiction of the House Committee on Science and Astronautics in order to enhance its status, making it a major committee, so that Brooks would be ineligible to remain on Armed Services while chairing a major committee. Here is where McCormack's interest in a Department of Science entered the picture, and McCormack was influential in helping to define the new jurisdiction along broader scientific lines. At the same time, Carl Albert was commissioned as Speaker Rayburn's trouble-shooter to buttonhole Chairman Oren Harris of the Interstate and Foreign Commerce Committee, whose committee would be forced to give up some jurisdiction to the new Science and Astronautics Committee.

"He gave in, but he didn't do it very easily," recalled Albert. "He twitched around a little bit about it, but he had Rayburn and McCormack on his neck so he had to do it."

JOINT COMMITTEE OR SEPARATE HOUSE AND SENATE COMMITTEES?

Early in 1958, both the House and Senate select and special committees were thinking in terms of creating a Joint Committee on Aeronautics and Outer Space. The concept of a joint committee was drawn from the experience of the Joint Committee on Atomic Energy.

Despite the known opposition of Speaker Rayburn to this concept, the joint committee was written into all the early drafts of the proposed Space Act legislation. At executive sessions held in the House Ways and Means Committee room, just off the House floor, on May 13, 14, 19, and 20, the joint committee concept remained in the bill and was unanimously approved by the select committee. When Chairman McCormack introduced a clean bill, H.R. 12575, on May 20, the joint committee not only survived but also received strong support in the committee report (House Report No. 1770), dated May 24:

The select committee gave serious consideration to the establishment of standing committees (on aeronautics and outer space) in the House and Senate, but decided instead on the establishment of a joint committee. The provisions of title IV of the bill are patterned closely after the provisions of the Atomic Energy Act creating the Joint Committee on Atomic Energy. * * *

Such a committee would provide a number of advantages. In addition to preventing possible conflicts and omissions, as well as unnecessary duplication, it would give Congress the means to oversee executive operations effectively in the highly important and urgent field of space flight.

Something funny happened to the idea of a joint committee on the way to the House floor. Between May 24, when the House select committee had glowingly endorsed a joint committee and June 2, when the bill was taken up in the House of Representatives, the joint committee suddenly fell from favor. Introduced on May 27, Carl Albert's Resolution 580 sailed through the Committee on Rules on May 29, putting the leadership squarely on record in favor of a separate standing Committee on Science and Astronautics for the House. When Majority Leader McCormack was explaining the action in killing the joint committee, he told the House of Representatives on June 2:

In the bill we provide for a joint committee, but we have eliminated that, and I am going to offer a motion to strike that out, because the Committee on Rules has reported out a resolution within the past few days establishing another standing Committee on Science and Astronautics, which gives it a broad base of legislative action, and in the light of that it will be unnecessary to continue the joint committee in this bill; at least, the members of the select committee feel that way.

Chairman McCormack told the House that on the morning of June 2, just before the bill reached the House floor, the select committee had unanimously agreed to strike the joint committee from the bill. McCormack moved on the floor to excise the joint committee, and his motion received no comment, debate, or objection and was accepted immediately without opposition. When the Senate considered the proposal, there were only passing references to the advantages or disadvantages of a joint committee. Senator Jacob Javits (Republican of New York) asked Senator Johnson whether the joint committee would have oversight jurisdiction over the National Aeronautics and Space

Policy Board. Johnson's response did not seem to indicate any deep and lasting commitment to the joint committee idea:

We felt that the joint committee, if in its wisdom Congress decides to establish it, will have oversight jurisdiction, and it is given such jurisdiction. We feel that is a very necessary and desirable part of the joint committee's functions.

There was some speculation that the early House support for a joint committee stemmed from the feeling that it might be easier to wrest new jurisdiction away from existing committees toward a joint committee rather than toward a new standing committee. Once the jurisdiction was obtained, it may have been less painful to shift it when the joint committee concept was dropped. Looming larger as a reason was the fact that many House Members feared the Senators on a joint committee might "hog" the limelight.

Although House Members and staff kept pointing at the Senate and charging they were the ones who were trying to "put across" a joint committee, Majority Leader Johnson's commitment seemed to be less substantive and more to regard this item as a bargaining chip which could be used to muscle the House into accepting some other provision which the Senate felt was more important.

The sudden 180-degree reversal in the House position from support of, to opposition to, the joint committee, came while the delicate negotiations to get Overton Brooks off the Armed Services Committee were underway. Speaker Rayburn was at the center of those negotiations. When the House-Senate conference committee convened on July 15, there was a dramatic scene at which the joint committee was buried for good. The smoking pistol of the executioner came clearly into view. Philip B. Yeager of the select committee staff remembers it this way:

The first hang-up we had was whether there was going to be a joint committee. Johnson, as I remember said:

"The first thing we are going to do is we are going to have a joint committee. I guess everyone has agreed on that, haven't they?"

He looked around, and McCormack was just sitting there, shaking his head. Johnson said:

"We're not going to have a joint committee?"

"No."

"Why not?"

"Mr. Sam says so."

McCormack added: "If you want to negotiate further, you'll have to settle that at the Texas level."

COMMITTEE ON SCIENCE AND ASTRONAUTICS OFFICIALLY SANCTIONED

Once the joint committee had been shelved, the way was paved for the House of Representatives to act separately to establish the

standing House Committee on Science and Astronautics. Two relatively junior Members of the House, both low on the totem pole in the prestigious Committee on Rules, shared honors in reporting Carl Albert's Resolution 580 out to the House of Representatives. The report from the Committee on Rules was written by a huge, St. Bernard-like Irishman from Cambridge, Mass., named Thomas P. "Tip" O'Neill, Jr., later to become Speaker of the House—who in 1958 was only in his sixth year in the House. Floor leader in charge of the debate on Albert's Resolution was a comparatively junior Congressman from Missouri, a protégé of Speaker Rayburn named Richard Bolling—who was serving his 10th year in the House.

O'Neill's report included these significant comments:

The purpose of and reason for this resolution is to set up a committee having full and complete jurisdiction in a broad area that has come to have great significance in recent years. Aside from the spectacular developments which are being made in outer space research and which have both military and civilian importance, mankind has reached that stage in the development of science and the industrial arts where governments must, as a matter of survival, give new emphasis and attention to basic research. Legislative action in those fields is certain to become a matter of greater frequency and greater importance in the near future. We think we have come to the time in which a committee with across-the-board jurisdiction in this area should be established. Our Government is now engaged in considerable research efforts in many fields of pure science, and it is the part of wisdom that these efforts be studied and examined from a legislative angle, and the establishment of this committee emphasizing this field will make a marked contribution in this direction.

When Bolling brought up the Albert resolution on July 21, there was very little debate and no opposition on the House floor. Bolling's statement, as is his custom, was succinct and to the point:

The standing committee will take over, and continue, the work started by the House Select Committee on Astronautics and Space Exploration. Certain functions of the Committee on Interstate and Foreign Commerce and the Armed Services Committee will be transferred to this committee; namely, legislation relating to the scientific agencies—the Bureau of Standards, the National Advisory Committee for Aeronautics (NASA had not yet officially been launched) and the National Science Foundation. The chairmen of the Interstate and Foreign Commerce Committee and the Armed Services Committee agree with these proposed transfers.

Bolling was perhaps technically accurate when he professed that Oren Harris and Carl Vinson agreed with the proposed transfers. Certainly Vinson, who wanted so badly to remove Overton Brooks from his committee, saw the logic of the jurisdictional transfers. But as time went on, both Harris and Vinson screamed lustily as the long tentacles of the fledgling committee began to reach into areas the old warlords regarded as their private domain. Hell hath no fury like a committee chairman who feels another committee is impinging on his jurisdiction!

During the debate on the Albert resolution, Majority Leader McCormack underlined the new scientific responsibilities which would fall to the Committee on Science and Astronautics:

This is a clear recognition on the part of the House of the importance of basic and applied research and the establishment of this committee as a standing committee to which legislation of that nature will be referred. It includes not only outer space legislation but it takes over other activities, and it is going to be, in my opinion, one of the most important committees of both branches of the Congress.

Republican Leader Martin, in endorsing the resolution, noted:

Mr. Speaker, as one who has been privileged to serve on this special committee, I want to say that I am heartily in favor of making this committee a permanent part of the House legislative system. * * * I want to pay my tribute to the nonpartisan way in which the committee has worked under Congressman McCormack. There was never the slightest semblance of partisanship shown at any of our hearings or in our committee votes.

The Albert resolution passed very quickly and unanimously. Thus the effective date of the new standing Committee on Science and Astronautics was scheduled for the opening of the new Congress on January 3, 1959.

THE WRITING OF THE SPACE ACT AND THE ESTABLISHMENT OF NASA

While the battle was going on to establish the House Committee on Science and Astronautics, the House Select Committee in the spring and early summer of 1958 was hammering out the Space Act which chartered the National Aeronautics and Space Administration.

It would be difficult to duplicate the feats performed by the select committee and its staff; in a few short weeks they accomplished the impossible. Here was a new committee, just established on March 5, with new staff just getting acquainted with each other, headed by the majority leader, minority leader, and minority whip who had other pressing official duties, suddenly plunged into the maelstrom of uncharted seas. The hot glare of publicity shone on their every action. The public was fearful and apprehensive at dramatic blows to America's prestige by the Soviet Union. The staff and members had to perform a triple function simultaneously: to get educated on the complexities of astronautics and space, to exercise oversight over the existing confusion which was the administration's space program, and to draft a new charter for a major regrouping of functions relating to the entire administration program. All these challenges had to be met yesterday, it seemed, and the targets were constantly moving.

The timetable reflected a true sense of urgency in the Congress. President Eisenhower on April 2 sent a message to the Congress along with an administration bill to absorb the National Advisory Com-

mittee for Aeronautics into a new National Aeronautics and Space Agency. The message arrived just as Congress left for a brief spring recess. The break-neck speed with which the select committee moved is reflected in the fact that Chairman McCormack opened public hearings on April 15, held 17 sessions through May 12, and charged onto the House floor with the NASA bill on June 2—just two months after the President had first revealed his recommendations on the new space agency. After a difficult and delicate series of negotiations with the Senate, the conference report was approved July 15, passed by the House on July 16, and signed by the President on July 29.

The speed as well as the depth and thoroughness of the committee's work will long stand as some kind of record for dedication and drive under tremendous pressure.

By way of contrast, the Senate moved more slowly, heard fewer witnesses (48 for the House and 20 for the Senate), met fewer days (17 for the House and 6 for the Senate), and called most of its witnesses from within the executive branch. The House, on the contrary, summoned not only military and civilian space experts, but sought the advice of scientists, university professors, and leaders in the aerospace industry.

The value of the hearings by the House select committee was clearly demonstrated by the questioning and probing which revealed the weaknesses and ambiguities in the administration bill. For example, committee members, staff, and witnesses soon discovered that the bill needed to be beefed up to strengthen congressional oversight and control, to cover international cooperation, relations with the Atomic Energy Commission, as well as the overall policy determination and coordination.

At first, administration officials balked at the very idea that staff underlings in Congress could improve on their fine handiwork. William Finan of the Bureau of the Budget, who helped draft the administration bill, lunched at the Congressional Hotel with Committee Staff Director Feldman and Assistant Director Sheldon, and according to Feldman he said:

"Everybody, you know, is getting carried away by this space thing—the Soviet Union beat us into space but we mustn't panic."

And then he handed us a bill that the administration wanted as the basis for the Act and he said:

"We don't want any changes in this." I didn't want to get into any argument with him—I didn't say anything to him—but I did report that back to the committee and the committee paid no attention to it at all, including the Republicans.

Once the administration witnesses and staff discovered the House select committee really meant business, had the facts and the know-

how, and wasn't about to be pushed around, attitudes suddenly changed. The administration quickly joined in, acknowledged the need for improvements, and helped draft amendments to try and fill the gaps exposed in the hearings and discussions.

A great amount of time in both open hearings and executive sessions was spent in determining more precisely agency jurisdictions, defining the fine line between military and civilian activities in outer space, and clarifying the machinery for coordination. As time went on, there developed a healthy give-and-take between the administration and the House committee. Because Chairman McCormack was anxious to draft a bill which would be satisfactory to both the committee and President Eisenhower, regular liaison was established between the committee staff and Bryce Harlow, Deputy Assistant for Congressional Affairs, and Edward A. McCabe, Administrative Assistant to the President. In fact, the daily liaison between the White House and the House side of the Capitol proved to be superior to the exchange of information between the House and the Senate. Under the stress of time requirements and pride of authorship, there developed a spirit of competitive one-upmanship between the House and Senate, complete with "confidential" committee prints, and some dog-in-the-manger attitudes toward privileged strategy and tactics.

When the Space Act was voted on in the House of Representatives on June 2, Republican Whip Les Arends made a cogent observation about the investment concept of space spending:

The original thought of the administration was that the costs of an adequate program under the proposed space agency would be between \$100 million and \$200 million a year to start with. After going into the matter carefully, however, and in light of the long leadtimes and exploratory activities necessary to the development of astronautical techniques, the committee has concluded that costs may approach \$500 million a year for the first several years and perhaps \$1 billion a year thereafter.

This is a lot of money. Possibly, on further inquiry, we may find that amount will not be needed. But even if it is, I suggest to you that the probable cost to the Nation of not spending it will be infinitely more. Besides, as other Members have already told you, the peaceful economic benefits and savings to result from the program should begin to more than pay its cost within a few years' time.

In changes which survived the legislative process, the House altered the "National Aeronautics and Space Agency" to a "National Aeronautics and Space Administration," and replaced "Director" with an "Administrator." The House bill as well as the final act added an important freedom-of-information section which, as stated in House Report 1770—

affirms the intent of Congress to let the people know all the facts, and to promote the spread of scientific knowledge, subject only to necessary security restrictions.

PATENT POLICY

When the administration sent its proposed bill to Capitol Hill, there was no language included concerning patent policy, a subject of intense interest to the aerospace contractors who would play such an important role in the space program. On May 24, when the House select committee made its initial report, a patent provision was included which was based primarily on the language and approach of the Atomic Energy Act, enabling the Government to retain control over patents resulting from research sponsored by NASA. The Senate committee included comparable patent provisions. By the time the bill reached the Senate floor for debate, Senator Johnson was subjected to intense pressure by a number of contractors, patent lawyers, and others who contended that the aerospace industry differed sharply from atomic energy, where most developments were Government controlled. In order to give the Senate a free hand in conference, Senator Johnson withdrew the Senate committee patent provision during the floor debate on the Space Act.

Prior to the meeting of the conference, Chairman McCormack appointed a Patent Subcommittee headed by Representative Natcher, and including Representatives Hays, Metcalf, Arends, McDonough, and Keating. The subcommittee and its staff discussed the problems involved with many interested parties, both Government and private, for several weeks. Although the Natcher subcommittee made some formal recommendations softening the original House patent language, it is interesting that the final version written into the Space Act was based primarily on a new draft produced at the conference committee by the Senate staff. As the conference opened, Select Committee Staff Director George J. Feldman observed:

Had I seen the Senate version before last night, I would have recommended the adoption of the Senate provision with a few minor changes, instead of the House proposal.

Obviously pleased, Johnson, who was chairing the conference, commented: "Well, there is a sign of a big man." The conference recessed for a few minutes and the House and Senate staffs came up with an agreement which was then incorporated into the Space Act as approved.

The final language written into law essentially gave title to the United States of those inventions made pursuant to NASA contracts, but gave authority to the NASA Administrator to waive title. Controversies over titles were to be referred to the Patent Office, subject to appeal to the Court of Customs and Patent Appeals.

In arguing for the adoption of the conference report, Chairman McCormack made these remarks about the patent provisions during the House debate:

The original patent provision was too closely patterned after the stringent requirements in the Atomic Energy Act which are not fully applicable to the space field. The substitute provision agreed to by the conferees protects both the interests of the Government and affords enough flexibility to the Space Administrator to let him meet needs for preserving the incentives of the individuals and companies whose efforts it is public policy to encourage.

The 1958 Act did not settle the controversy over patent rights, despite the initial attempt by the select committee and the Congress to meet the issue head on. Down through the years, droning through voluminous pages of very legalistic testimony, the issue remained one of the most complex to be tackled by the committee. From the start, contractors felt that the 1958 act went too far in depriving them of the benefit of their inventions which involved heavy investments. As we shall see, the original provisions of the 1958 act on patent policy were softened by administrative rulings in subsequent years.

THE NATIONAL AERONAUTICS AND SPACE COUNCIL

During the debate on the Space Act of 1958, the House had provided for an advisory committee and the Senate for a policy board. To achieve a compromise, Senator Lyndon Johnson persuaded the President that the Space Council would not erode his power if the President were made the statutory Chairman of the Council. Senator Johnson sold the idea to the House and the conference committee.

When Chairman McCormack presented the concept of the Council to the House of Representatives on July 16, he was eloquent:

Like the National Security Council, this new group will bring together a small number of top leaders of Government, and additionally allows the President to recruit leaders in science and administration from private life to advise him on the overall needs for a thoroughgoing national program and how it should be divided and coordinated between the Department of Defense and the National Aeronautics and Space Administration. * * * The result is to place the space program at the high level of Government that its great importance deserves.

Subsequently, President Eisenhower never filled the position of executive secretary of the Council. The Council lapsed into innocuous desuetude. James R. Killian, Jr., writing in *Sputnik, Scientists, and Eisenhower*, put it this way: "The Space Council never did very much during the Eisenhower administration, to the relief of the officers of NASA." It was revived under President Kennedy when Vice President Lyndon Johnson was made Chairman of the Council.

ANNUAL AUTHORIZATIONS FOR NASA

The House select committee in a somewhat roundabout way also helped strengthen the power of its successor, the House Committee on Science and Astronautics. History may conclude that it was in spite of, rather than because of, the House select committee. In any event, the issue arose in a somewhat casual way without the kind of preplanning which Speaker Rayburn liked on his taut ship.

A few weeks after the President had signed the Space Act on July 29, the House of Representatives took up a supplemental appropriations conference report on August 20. Congressman Gerald Ford suddenly arose to object vigorously to a conference committee provision which had been inserted in the Senate, reading:

No appropriation may be made to the National Aeronautics and Space Agency [sic] unless previously authorized by legislation hereinafter enacted by the Congress.

Ford proceeded to denounce a provision which he argued placed an unnecessary burden on NASA. He contended:

In effect, what you are telling the people of this new agency is that they have to spend about half their time up here first before an authorization committee and then before an appropriations committee to get any money whatsoever for their operations. Instead of * * * spending the maximum amount of time in running their agency and trying to give us the needed impetus to get ahead or stay ahead of the Russians, they are going to be up here justifying every penny they get for operations and construction before four committees of the Congress.

What Ford did not mention, of course, was that the annual authorizations required of NASA were the real tools for legislative oversight needed to give muscle to the House Committee on Science and Astronautics. Looking back in 1978 on his fight against annual authorizations, Ford reminisced:

I, having been on Appropriations, was always suspicious that annual authorizations would interfere with the appropriations process and I think there was some justification for that concern. I think it is probably less so now than it was at the outset, but the original concept there was a real, legitimate concern * * *. We all suspected and we can't prove it that Lyndon wanted that annual authorization because it gave him a vehicle to keep himself in the spotlight.

Ford's forceful rhetoric quickly won over other members of the House select committee.

"I want to associate myself emphatically with the gentleman from Michigan," proclaimed Representative Kenneth Keating of New York. "This agency is going to be concerned with a great many matters that are vital to the future welfare of this country. To hamstring them this way is a great mistake."

Representative Gordon McDonough of California wanted to know:

How, for instance, are we going to continue on a program of research on cosmic rays or satellites * * * where it requires research and development for months and

months and perhaps a year, if we come up to a point where we have to come back to a committee and say, "Well, we have gone so far, and we ask for a few more million dollars." This is a ridiculous provision.

The dominoes began to fall. Representative B. F. Sisk (Democrat of California) joined the concert:

I, too, was concerned about this language when I found it in the Senate discussion of the matter. Does the gentleman agree with me that this is in direct contradiction to the language we placed in the original authorization bill for the agency?

Ford decisively responded: "It seems to me it is about 95 percent in opposition to the basic legislation for the space agency."

Everybody rushed to get into the act. Representative Walter Judd (Republican of Minnesota) eloquently declared:

The gentleman from Arkansas (Mr. Hays) and I were in England in the late summer of 1944 when Hitler sent across his first V-2's. That was just two months or so after our Expeditionary Force had left England to land in Normandy. It was said in all quarters that had Hitler been able to launch his V-2 just 4 months earlier, he might have won the war. Are we here today to take chances on four, six, eight months, or a year of delay in this most important field?

Ford warmed to his task:

If this language which is in disagreement is included, before the Space Agency can hire one clerk, one single clerk to do some typing, they have to come to Congress and get an authorization by the Congress on an annual basis.

Against the flood of oratory, there was only one Congressman (not on the House select committee) who dared to stand up and fight for the annual authorization. He was Representative Albert Thomas (Democrat of Texas) chairman of the Independent Offices Subcommittee which handles NASA appropriations. Thomas lifted his glasses high on top of his forehead and twanged away:

What is wrong with them coming over and letting the Congress determine? After all, we do the legislating. Is there anything wrong in the Congress legislating? Whose duty is it to legislate, the executive's or that of the legislative branch?

But Thomas was at this point like King Canute trying to sweep back the ocean. Ford and his allies won the day to knock out the provision requiring annual NASA authorizations, by a decisive vote of 236 to 126.

The aftermath of the House action was sudden.

Dr. Sheldon reached Chairman McCormack in New Hampshire where he was vacationing. According to Sheldon:

It's the only time ever that McCormack really chewed me out. He was furious. It turns out that he had made an agreement, in private, with Lyndon Johnson to accept the change and had failed to tell any of us. Lyndon Johnson then called Sam Rayburn, and said, "This has to be undone."

Speaker Rayburn moved his big guns out to reverse the August 20 decision in the House. The Senate voted 86-0 to stand firm in its position and the conferees reassembled. A compromise was reached,

and the provision was reworded to require authorizing legislation only for the period until June 30, 1960. Ford thundered:

It is my opinion that this one-year trial run will prove the unsoundness of following the Senate position.

Keating chimed in: "I am sure it will." The chairman of the Committee on Appropriations, Representative Clarence Cannon (Democrat of Missouri) concluded, "The effect of it is to leave the whole matter for the next Congress."

With very little fanfare, it might be noted, Congress in 1959 quickly reintroduced the requirement for annual NASA authorizations and the measure went through with no objection. But just as Lyndon Johnson consistently and effectively supported the space program from the very start, and furnished strong executive leadership as President, so it must be noted he furnished the House Committee on Science and Astronautics with one of its most powerful weapons for effective oversight.

REPORTS OF THE HOUSE SELECT COMMITTEE

By year's end in 1958, the House select committee had turned out an impressive series of detailed studies and reports which received wide and favorable recognition. Perhaps the most popular was the space primer, entitled "Space Handbook: Astronautics and Its Applications," prepared by the Rand Corp. in accordance with policy guidance and with the editorial assistance of the committee staff. The Space Handbook with illustrations was a 252-page product which covered space environment, trajectories and orbits, rocket vehicles, propulsion systems, propellants, internal power sources, structures and materials, flight path and orientation control, guidance, communication, observation and tracking, atmospheric flight, landing and recovery, environment of manned systems, space stations and extraterrestrial bases, nuclear weapons effects in space, cost factors and ground facilities, observation satellites, meteorological and navigation satellites, balloon satellites, bombing from satellites, scientific space exploration, and astronautics in the U.S.S.R. and other countries. The handbook was so popular it was reprinted in paperback.

One of the earliest publications of the select committee was "The National Space Program," a 236-page document in layman's language which was published May 21, 1958, and was written primarily by Frank B. Gibney, a committee consultant.

Among other studies and reports completed by the select committee were the following:

International Cooperation in the Exploration of Space.

Survey of Space Law.

The International Geophysical Year and Space Research.

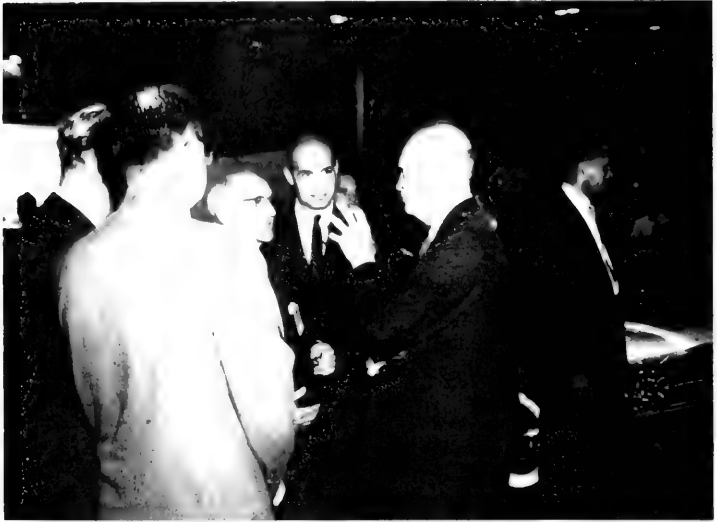
Of interest also is an unofficial "Legislative History of the Space Law," totaling 1,346 pages of text and copies of numerous drafts of the 1958 Space Act, prepared by Raymond Wilcove of the staff of the House Select Committee but never formally approved for release. A copy of Mr. Wilcove's study is deposited in the Library of Congress.

A very significant study compiled by the House select committee, entitled "The Next Ten Years in Space 1959-1969" was not officially approved for release until early 1959 and therefore will be discussed in the next chapter on the beginnings of the House Committee on Science and Astronautics.

The House Select Committee on Astronautics and Space Exploration came to an end on January 3, 1959. The select committee provided a smooth launching pad for the House Committee on Science and Astronautics and its successor, the present House Committee on Science and Technology.



Membership and staff of select committee: Front row, from left, Representatives William H. Natcher (Democrat of Kentucky), Lee Metcalf (Democrat of Montana), Overton Brooks (Democrat of Louisiana), John W. McCormack (Democrat of Massachusetts), Joseph W. Martin, Jr. (Republican of Massachusetts), Gordon L. McDonough (Republican of California), and James G. Fulton (Republican of Pennsylvania). Second row, from left, Mary Myron, Richard P. Hines, William Coblenz (on loan from LRS), Raymond Wilcove, Dr. Charles S. Sheldon II, George J. Feldman, Spencer M. Beresford, Philip B. Yeager, Joseph Moran, and Jean Cameron. Other members of the select committee not included in the photograph were Representatives Hays, O'Brien, Sisk, Arends, Keating, and Ford.



Representatives R. Walter Riehlman (Republican of New York) and Emilio Q. Daddario (Democrat of Connecticut) converse with President Dwight D. Eisenhower during inspection of George C. Marshall Space Flight Center at Huntsville, Ala., September 8, 1960.



The committee in its first year:

From left: Representative David S. King (Democrat of Utah), Charles F. Ducander, (executive director and chief counsel), Representatives J. Edward Roush (Democrat of Indiana), Ken Hechler (Democrat of West Virginia), Dr. Wernher von Braun, Representatives Walter H. Moeller (Democrat of Ohio), James M. Quigley (Democrat of Pennsylvania), Victor L. Anfuso (Democrat of New York), James G. Fulton (Republican of Pennsylvania), Dr. Charles S. Sheldon II (technical director).

In front: Representatives Overton Brooks (Democrat of Louisiana) and B. E. Sisk (Democrat of California).

CHAPTER II

The Overton Brooks Years, 1959–61

At the stroke of noon on January 3, 1959, the House Committee on Science and Astronautics officially came into being.

A grim reminder of the challenge facing the new committee was contained in screaming black headlines announcing that on January 2 the Soviet Union had launched another heavy rocket with an instrumented payload of 796 pounds, headed toward the Moon. Even though "Lunik" missed the Moon and eventually orbited the Sun, it was front-page news during the first week of the committee's existence.

The new committee was authorized to have 25 members—16 Democrats and 9 Republicans. The increased number of Democrats reflected the larger Democratic majority in the 86th Congress. It took until January 19 to complete the delicate process of tapping new members, and on that date the following were officially certified as charter members of the new committee:

Democrats

Overton Brooks, Louisiana, *Chairman*
John W. McCormack, Massachusetts
George P. Miller, California
Olin E. Teague, Texas
Victor L. Anfuso, New York
B. F. Sisk, California
Erwin Mitchell, Georgia
James M. Quigley, Pennsylvania
David M. Hall, North Carolina
Leonard G. Wolf, Iowa
Joseph E. Karth, Minnesota
Ken Hechler, West Virginia
Emilio Q. Daddario, Connecticut
Walter H. Moeller, Ohio
David S. King, Utah
J. Edward Roush, Indiana

Republicans

Joseph W. Martin, Jr., Massachusetts
James G. Fulton, Pennsylvania
Gordon L. McDonough, California
J. Edgar Chenoweth, Colorado
Frank C. Osmer, Jr., New Jersey
William K. Van Pelt, Wisconsin
A. D. Baumhart, Jr., Ohio
Perkins Bass, New Hampshire
R. Walter Riehman, New York¹

OVERTON BROOKS AS CHAIRMAN

Every congressional committee carries the imprint of its chairman in its mode of operation, areas of activity, and effectiveness. Overton Brooks clearly set the tone of his new committee which plunged into wide-ranging investigations, studies, and hearings covering space

¹ Riehman was appointed on Jan. 29, 1959

propulsion, scientific manpower and education, missile development, chemical warfare, agriculture, space law, communications satellites, inventions, weather, and biomedical experiments to mention just a few of the areas covered.

The 61-year-old chairman of the new Committee on Science and Astronautics was a tall and courtly gentleman, hard-driving, highly ambitious, proud, demanding, controversial, and determined to leave a record of activity and accomplishments for the committee. A 6-footer, Brooks was not flashy in appearance, dressed conservatively, and although he had a ready laugh he was serious minded. His graying blond hair was combed in a semipompadour. His left eye was slightly out of focus, and when he peered out from behind his horn-rimmed glasses it sometimes seemed he wasn't looking directly at you.

Born into a family of public servants, Brooks was the nephew of U.S. Senator John H. Overton, of Louisiana, and another uncle, Winston Overton, served on the Louisiana Supreme Court. Brooks was born in Baton Rouge in 1897 and served overseas as an artilleryman in the 1st Division in World War I. After only 30 days of training, he was thrust into combat in France with the 1st Division, astride a horse pulling a caisson. Never having ridden a horse before, Brooks recalled: "I fell off three times." He earned a law degree at Louisiana State University, practiced law in Shreveport, and served as U.S. Commissioner for a 10-year period. In the Roosevelt landslide of 1936, Brooks was first elected to the House of Representatives from the Shreveport district in northwestern Louisiana.

Assigned to the old Military Affairs Committee which merged into the Armed Services Committee, by 1949 Brooks had risen to No. 2 in seniority. He chafed at the fact he could not get the attention and publicity which Chairman Vinson was receiving. He dreamed of the day when he could run the Armed Services Committee with the same awesome power exercised by Chairman Vinson.

The story goes that while Lyndon Johnson was a member of the old House Naval Affairs Committee when Vinson was chairman, Johnson wanted to ask a question about the Corpus Christi Naval Base during testimony by a Navy admiral. His glasses perched on the end of his nose, Chairman Vinson peered down toward the end of the rostrum and growled:

"And how long have you been a member of this committee?"

"Six years, Mr. Chairman," Johnson answered.

"Well, then, if you've been here for 6 years, I guess you're entitled to one question," Chairman Vinson barked.

As the new chairman of the House Committee on Science and Astronautics, Brooks at first tried to emulate Chairman Vinson. According to Executive Director Ducander:

He tried to copy him, word for word, sentence for sentence. There was only one Mr. Vinson, and because of the way Congress has changed, there'll never be another one like him because he was a benevolent dictator. Well, Mr. Brooks tried to be the same thing, but he failed in one respect, he was not benevolent and he was not like Mr. Vinson so he couldn't emulate him.

During the first year of the new committee's operation, Brooks centralized power in his own hands, and he also declined to set up any subcommittees. This created rebellion among the senior members of the committee, some of whom had been persuaded by the leadership that their seniority on the new committee would enable them to have new responsibilities and rise within the congressional hierarchy. Strong pressure from the senior members finally persuaded Chairman Brooks to appoint subcommittees. But even then, he was reluctant to assign subject matter titles to the subcommittees, and preferred to number the subcommittees 1, 2, 3, and 4 in conformity with the practice of the Armed Services Committee.

For the eight freshman Democrats on the committee, Brooks was a good leader even though he was peripatetic. To be sure, it took a long time for a freshman legislator to be reached down the line in order to question a witness during a hearing. By 11:30 a.m., when all the whipped cream had been skimmed off the really important issues, and the press table was deserted as newsmen peeled off to file their afternoon copy, the freshman at last had his chance. At this juncture, of course, he was prodded along by the chairman's warning that the House would convene at noon, and there were eight eager freshmen who had to divide up the remaining time. But the subject matter was so fascinating, and Brooks was so enthusiastic about getting into new topics that his interest was contagious. On some very rare occasions, Brooks might even flatter the freshman members by announcing: "Today, we'll start the questioning at the bottom of the committee instead of by seniority."

Chairman Brooks was very sensitive and eager to score a good record for his new committee. A tireless worker, he frequently remained in his office until 8 or 9 p.m., was always in the office on Saturdays and often on Sundays. He made a special effort to get a favorable press, called frequent news conferences, urged radio and television stations that he was available for interviews, and arranged to be taped for rebroadcast over "Voice of America." On the negative side, he was always fearful lest his committee or any of its members

might do something which possibly could be portrayed unfavorably in the press. For example, he made a big public issue of the fact that he was personally turning down the request of Representative Victor Anfuso (Democrat of New York) to take his subcommittee to the Soviet Union to meet with Khrushchev. In a play for press and editorial attention—which he received—Brooks publicly expressed his doubt that the Anfuso subcommittee—

no matter how talented, sincere, and devoted, could add much to our international cooperation by a visit to Khrushchev, the Butcher of Hungary, and by the action of personally eating caviar and drinking vodka with him.

COMMITTEE MEMBERSHIP

Six veterans of the select committee helped form the nucleus of the new committee—Brooks, McCormack, Sisk, Martin, Fulton, and McDonough. McCormack seemed reluctant to play an active role on the new committee, lest he upstage the new chairman. McCormack's duties as majority leader became more burdensome during Speaker Rayburn's last term, and McCormack left the committee after the close of the 86th Congress in 1961. Martin was minority leader when he was chosen for the committee, but on January 6, 1959, Representative Charles Halleck of Indiana scored a stunning upset by wresting the leadership position from Martin, 74-70. Although Martin remained on the committee, he rarely attended hearings and was inactive. Martin encouraged Fulton to take the lead as the next highest ranking Republican, and be the spokesman for the minority. McCormack rejoined the committee, but he did not stay long.

With McCormack fading out of the picture, the effective ranking Democratic member of the committee was Representative George P. Miller of California. For Miller, vaulting from 14th ranked member of the Armed Services Committee up to No. 2, the Committee on Science and Astronautics furnished a great new opportunity for responsibility and leadership. For Olin E. "Tiger" Teague of Texas, membership on the new committee resulted from several conversations with Speaker Rayburn. As chairman of the Veterans' Affairs Committee—a committee Teague enjoyed and worked hard on—Teague nevertheless asked Speaker Rayburn to be assigned to another committee. "I was working on the past * * *. I also wanted to work on something that pertained to the future of the country," Mr. Teague told Speaker Rayburn, and Rayburn then asked him to go onto the Committee on Science and Astronautics.

Representative Anfuso attracted a great deal of publicity, not only because of his planned trip to the Soviet Union—which he eventually took by himself—but through other activities and statements. A color-

ful, popular Congressman, Anfuso held the first congressional hearings on women astronauts. Meanwhile, Representative B. F. Sisk of California did a quiet and workmanlike job, as he had on the select committee.

Although eight freshman Democrats were assigned to the new committee, the Republican members were all veterans of several terms of service. Congressman Chenoweth of Colorado was serving his ninth term; Riehlman of New York and Osmer of New Jersey were in their seventh terms; Baumhart was in his fourth term; and Bass, in his third term.

RECRUITMENT OF STAFF

One of the first tasks which faced Chairman Brooks was the recruitment of staff. He wanted to have his own people with whom he had worked, who knew his methods of operation, and could sense how he would react while he was not available personally—chairing hearings, visiting his district, touring installations, or occupied with other pressing business. This was perhaps even more important because Brooks himself tended to be unpredictable in some of his actions and reactions. At the same time, Brooks sincerely attempted to assemble a staff which was both professional in its competence, and technically proficient.

Chairman McCormack had developed a firm and healthy relationship with the select committee staff, headed by George Feldman. The members of the staff overflowed with affection and respect in their deeply appreciative letters to Chairman McCormack and all members of the select committee on July 21, 1958, which included these words of praise:

The whole record of hearings makes clear the active and intelligent participation of the members of the committee. This kind of interest and support has made our work for you more meaningful. We also appreciate the opportunity we have been afforded in executive sessions to express our views on the reports and the draft legislation before the committee. * * * It was the inspiration of leadership shown by the members and the chairman which made it easy for us to devote the long hours we did to our efforts, and which turned a burden into a rich and satisfying experience. * * * We have been treated with unfailing courtesy and friendship without partisanship ever influencing the treatment we have received, any more than party lines influenced our warmth of feeling for all the members.

Representative Ford in a response to Feldman noted: "This joint letter reaffirms my belief that a real 'team-work' job was done."

It was against this backdrop that Brooks began considering how he should organize his staff. At a meeting in Majority Leader McCormack's office, Brooks asked Feldman to stay on, but Feldman had already decided to leave. "Then I made a real hard pitch for Dr.

(Charles' Sheldon," said Feldman. "I just went all out, only for one reason, that was because Sheldon was not only dedicated but he knew more about this than anybody else and he was far and above anybody that they could have, or get."

Brooks decided to keep Sheldon, Spencer Beresford, Richard P. Hines, Raymond Wilcove, Harney S. Bogan, Jr., and Philip B. Yeager—all members of the loyal and dedicated select committee staff. They were all present at the creation of the standing committee, contributed a great deal toward launching the committee, and all had euphoric memories of the idyllic days when working for John McCormack had been such an inspiration. This fact alone caused unfortunate comparisons which affected staff morale. Also, Sheldon and Beresford had high hopes of moving up to the two top posts on the staff. They were rudely disappointed.

During the period when Rayburn, McCormack, and Vinson were negotiating to move Brooks from ranking Democrat on the Armed Services Committee to chairman of the new Science and Astronautics Committee, Brooks did a lot of soul-searching with Charles Ducander, his Shreveport staff counsel on the Armed Services Committee. Ducander had been with Brooks since 1949. "Duke" advised Brooks that if the latter were ever going to realize his ambitions for the governorship or the Senate, "he would have to get out from behind Mr. Vinson." Finally, Brooks told Ducander: "Well, I've made up my mind. I'll go over and take that chairmanship if you come with me."

Ducander balked. He was getting no advance in salary, and was moving from a happy situation into an unknown jungle of tangled and uncertain relationships, led by a chairman who could not hold a candle to Carl Vinson in power, prestige, and respect. But there was no slipping out. According to Ducander:

Mr. Vinson called me in and said: "Duke, you've got to go. Now if anything goes wrong, you can always come back."

With Vinson, that was not a request or a suggestion; it was an order.

So it was that early in January 1959, Charles Ducander became executive director and chief counsel of the new standing committee. Brooks named Sheldon as technical director, Beresford became special counsel, Yeager was called special consultant, and the other staff members were given titles ranging through various degrees of "consultant" or "counsel." John Carstarphen, a Shreveport lawyer, was brought in to serve as counsel (he later became chief clerk and counsel) and several other Louisiana residents were recruited in relatively

minor positions. Brooks also borrowed on reimbursable detail a series of officers from the Army, Navy, and Air Force who came over, one at a time, to assist the committee staff. These officers were generally of high caliber, and the committee gained substantial support through their technically competent staff work.

In terms of arranging hearings, producing a monumental number of professional staff reports, and keeping the 25 committee members briefed during a very fast-moving situation in a technically complex field, the staff performed remarkably well during the Brooks chairmanship, 1959-61. Ducander assumed the dual role of briefing the chairman and directing the staff. Because of the difference in backgrounds of various members of the staff, there were serious and voluble disagreements over countless points of jurisdiction, leadership, direction, and quality of performance. Occasionally, these disagreements erupted into public print, to the horror of Chairman Brooks.

Perhaps the most serious attack publicly made on the committee was printed in the widely read editorials of Robert Hotz in *Aviation Week and Space Technology*. Hotz had printed some highly complimentary remarks in his editorial columns about the select committee during 1958, and in 1959 he began to compare the new committee, its staff, and its leadership very unfavorably with the select committee. Then on February 1, 1960, Hotz blasted the committee and Chairman Brooks in particular. On the staff, he leveled these charges at Brooks:

He has failed to appoint a technically qualified professional staff, without which the committee cannot hope to be taken seriously, and has apparently used residency in his home district of Shreveport, La., as the sole qualification for what staff appointments have been made. This failure to provide the committee with a professionally qualified staff and the curious practice of Chairman Brooks forbidding staff members to provide questions to other committee members has turned the current hearings into a series of petty squabbles and allowed them to drift into bayous of technical stagnancy rather than keeping sharply in the mainstream of current space problems.

Chairman Brooks was stung by the editorial. He telephoned Hotz and invited him to have lunch with him at the Capitol, where he discussed at length these and other accusations. He wrote a lengthy rebuttal to the editorial which was a masterful response covering every point which Hotz raised (the answer was printed in the February 22, 1960, issue). Among Brooks' comments on the staff were the following:

Knowing as we do that Members of Congress are, generally speaking, not experts in science and in space technology and exploration, this committee has tried to gather together a competent and experienced staff. We feel that we have done so. It is headed by a career congressional employee who is regarded as one of the foremost professional staff experts on Capitol Hill, with more than 11 years' experience.



Representative Overton Brooks (Democrat of Louisiana), right, the first chairman of the Committee on Science and Astronautics, receives a model of the Saturn launch vehicle from Dr. T. Keith Glennan, the first Administrator of NASA.

Another member of the staff has had 16 years of congressional experience. Most of the staff is composed of veteran members of the staff of the Select Committee on Astronautics and Space Exploration which preceded this committee and worked with House Majority Leader John McCormack in drawing up the Space Act of 1958 which created NASA. The staff is a highly professional, competent, and nonpolitical group which won the praise of Mr. McCormack and the other members of the select committee, both Republicans and Democrats.

It is true that the staff is not composed of scientists and technicians. This is a legislative committee and not a scientific body. However, there are several highly competent men on the staff with broad technical knowledge and the committee implements the work of these technical experts by employing scientists and engineers as special consultants on a per diem basis. No effort is overlooked to supply the committee with the best technical advice possible.

Nevertheless, the editorial had a more dramatic effect than Brooks' written response. The chairman called in Mr. Ducander, and laid down the law: no more Louisiana staff appointments. When a young lawyer named Frank R. Hammill, Jr. (not from Louisiana) filed an application for a staff appointment in mid-February 1960, he was hired with break-neck speed. Suddenly, staff questions for members other than the chairman began to be circulated. The net effect of the scorching editorial was generally salutary within both the staff and the entire committee operation.

GETTING THE COMMITTEE ORGANIZED

The early days of January 1959 were bedlam for the new committee. "The 86th Congress, bursting its buttons with ideas and Democrats, may be in for a historic run," predicted the Washington Post. Catapulted into the space age, the new committee's biggest problem was finding adequate space. While the staff was scurrying around to borrow hearing rooms from the Veterans' Affairs Committee, the Armed Services Committee, and making arrangements to use the caucus room in the Cannon Office Building, the architects and carpenters were frantically hammering away in room 214-B of the Longworth Office Building, across the hall from the basement cafeteria. Not until mid-March were the makeshift rostrum and other arrangements completed so the committee could have its own space. But the new room was terribly cramped for both members, staff, and most of all for the many spectators who crowded in, or tried to stand in the back.

While the staff was rushing around to arrange for the parade of witnesses, and getting the subject matter background lined up, they also had to double as purchasing agents for the new drapes, arrange to push out the typewriter repair shop which occupied part of the space, and rush to get everything ready for the grand opening.

FIRST MEETING OF THE COMMITTEE

On January 19, 1959, the Democratic and Republican caucuses had completed their work and the new membership of the Science and Astronautics Committee became official. Wasting no time, Chairman Brooks immediately called an executive session of the new committee for 10 a.m. on January 20, in the cavernous caucus room of the Cannon Building.

On that historic day when the House Committee on Science and Astronautics first met, the outside world paid no attention at all to their deliberations. In fact, the news was pretty dull and routine that day, and the headlines might have applied to nearly any year before or since. "President Asks Action To Curb Rising Prices" blared a 4-column headline in the Washington Evening Star. The Washington Post dutifully reported a recurring, predictable situation: "Iced-Up Roads Snarl Traffic." The story reiterated the obvious: "The American Automobile Association received hundreds of distress calls, and found difficulty dispatching aid because of the same conditions that caused the trouble."

To be sure, it was an executive session with the press barred. But Chairman Brooks, an eager seeker after good publicity, was strangely silent in his public comments. The acoustics were atrocious as the members eagerly leaned forward to interpret the stream of resolutions and 19-paragraph committee rules which were read; 23 out of 24 committee members (Representative Riehlman was not appointed until January 29) showed up for the first meeting, which proceeded smoothly with passage of resolutions to organize the staff and adopt the committee rules.

Chairman Brooks welcomed the new members, and also spent a few minutes stressing how important it was to have Majority Leader McCormack and the former Speaker and former Minority Leader Martin serving with the committee. He stated there was no room for narrow or partisan considerations in the future operation of the committee. He noted that it would be his policy to conduct a maximum amount of the committee's business in open session, and he added a caution to all the members to guard classified information which would be brought out in executive session or documentary materials made available to the committee.

Perhaps the biggest accomplishment of that first meeting was to enable the members of this new committee to mill around and get to know each other a little better. But it was dramatically different from the organization meeting of any other committee. There was a sense of destiny, a tingle of realization that every member was embarking on a

voyage of discovery, to learn about the unknown, to point powerful telescopes toward the cosmos and unlock secrets of the universe, and to take part in a great experiment. To be a charter member of a new committee was exciting enough. But to take part in deliberations which held such a great promise for the benefit of all mankind was a challenge which stirred the blood of all the members.

THE FIRST PUBLIC HEARING

Chairman Brooks drove his staff hard to get off to a fast start, and to hold a series of public hearings which would focus attention on the space program, missile development, and space sciences. Ducander bluntly observed, after the fact, that "Brooks was insane to have committee hearings as soon as he was confirmed as committee chairman." But Brooks was determined, and the chairman's will prevailed.

In publicly announcing on January 31 that hearings would open on February 2, Brooks stated: "The purpose of these hearings is to present to the members of this committee a picture of the situation as it exists today in the fields of science and astronautics." He added:

How does the United States stand in these areas, so vital to the continued existence of the free world?

Is Russia really ahead in science? In astronautics? In space exploration? In missiles and rockets?

Conflicting claims have been made as to the relative positions of the United States and the Soviet Union. We hope that the testimony presented to the committee at these hearings will clarify the picture and bring it into sharper focus.

Ours is a new committee and one which will, in my estimation, grow increasingly important as time passes. These hearings represent a start in the task which this committee has set itself—to help advance science and astronautics in the interests of national defense and the security of the free world.

Brooks scheduled Dr. T. Keith Glennan, NASA Administrator, as the leadoff witness, and announced four days of hearings including the Army, Navy, and Air Force. Care was taken to specifically designate that one of the Army witnesses would be the renowned Dr. Wernher von Braun.

Finally, the magic day arrived—Monday, February 2, 1959—the first official hearing of the new committee. As he pounded his gavel to open the hearing in the big Cannon caucus room, Chairman Brooks expressed his personal feelings about the historic event:

Gentlemen of the committee, this is the first public activity of the newly constituted Committee on Science and Astronautics. * * * Although perhaps the principal focus of the hearings for the next several days will be on astronautics, it is important to recognize that this committee is concerned with scientific research across the board.

Brooks expressed concern, not so much about the known lag behind the Soviet Union, but in the fact that different governmental authorities were furnishing different appraisals about where America stood. "The public is confused," Brooks declared. "These hearings, if they do anything, should clear up this confusion among authorities. * * * This is no time for kid-glove conversation, but it is a good time to present to the public the plain and unvarnished truth."

Brooks then lapsed into a discussion of strictly military matters, which soon became a bitter bone of contention with Carl Vinson and his Armed Services Committee over issues of jurisdiction:

We are definitely behind Russia in the development of the intercontinental ballistic missile, so important to our survival. We must overtake and surpass Russia in this respect, and I am sure this committee is resolved to do everything within its power to encourage and stimulate our leaders to reach the goal of overtaking and surpassing Russia in this part of our national defense.

Speaking for the Republican side, Fulton abandoned his customary stance as a proponent of far-out concepts and soberly declared:

The field is much broader than a race with Russia, and we in this committee, I hope, on the Republican side, will see that the implementation is given for broad scientific advances, not only for our security in a race with Russia but for the benefit of all mankind.

Lastly, I believe we on this side want to see these scientific advances made available for the whole world—all the scientists—so that every people, that is, our allies as well as the people behind the Iron Curtain, can move ahead, raise their standards of living, and arrive at a peaceful world.

In the course of the first group of hearings, originally planned to last 4 days but which actually stretched out over 11 days, morning and afternoon, the committee scored some telling points. The overwhelming thrust of the committee questions and observations added up to stressing a sense of urgency on the witnesses and the agencies they represented. At the same time, the opening hearings provided a wealth of informative material to help publicize the entire program, educate the public as well as the members of the committee, and awaken the Nation.

"THE NEXT TEN YEARS IN SPACE, 1959-1969"

The first publication officially sanctioned by the House Committee on Science and Astronautics was a prophetic report entitled "The Next Ten Years in Space, 1959-1969." At its executive session on February 2, 1959, the committee authorized the publication of this provocative study which actually had been completed under the aegis of the select committee under the direction of George Feldman and Dr. Charles Sheldon.

"This report is one of the most fascinating studies ever prepared for the Congress," lyrically states the introduction. It all started when the thinking of the leading scientists, engineers, industrialists, military officials and public servants was solicited to give their prophecies under the pretentious title of "Whither the Space Age in the Next Decade." Naturally, when eminent authorities in the United States, Great Britain, Germany, Italy, and the Far East were asked by the majority leader of the House of Representatives to give their considered opinions on the world of the future, they responded quickly in a remarkable series of analyses.

It is interesting to measure the predictions against what actually happened during the decade. So far as manned flight to the Moon and return, the most optimistic was Dr. Herbert York, Director of Defense Research and Engineering, who prophesied that man could first set foot upon the lunar dust in "just about 10 years (perhaps in as little as 7, if a high priority were placed on this goal)." Donald W. Douglas felt that—

certainly within 10 years manned flights around the Moon and return can be accomplished, and possibly during that time manned landings on the Moon and return will be possible.

Dr. Wernher von Braun correctly noted that neither Soviet nor American technology would be far enough advanced in the next decade for manned flights to Mars or Venus, but that instrumented probes to those planets "are a certainty." Arthur C. Clarke, English scientific author, very correctly foresaw the day when stationary satellites would make television available to everyone on Earth. The predictors were perhaps too optimistic in their assessment of the precision of weather predictions which might result from weather satellites.

The dunce cap for the worst prediction perhaps should go to the unnamed expert who was sure that mail delivery in the space age would be considerably speeded up.

One of the most significant aspects of the committee publication was the focus it concentrated on the goal of reaching the Moon within a decade, which later became the most dramatic aspect of the space program.

THE COMMITTEE JURISDICTION

One of the outstanding contributions which Chairman Brooks made toward the development of the Committee on Science and Astronautics was his incessant effort to both preserve and broaden the jurisdiction of the committee. Lacking the clout of a Carl Vinson, without the great personal and official power of a John McCormack, and absent the finesse of many other committee chairmen, Overton Brooks kept up such a whirlwind of activity in so many different fields that he was a

difficult target to contain. His technique was to continue to "test the jurisdiction" of the new committee through a manifold series of hearings, reports, speeches, and activities which frequently remained unchallenged because of the rising popularity of and interest in space by the American public.

Brooks fully appreciated the fact that the House committee was chartered with a broader scientific jurisdiction than the Senate committee. He encouraged a number of hearings and reports in this area to demonstrate the committee's responsibility for the National Science Foundation, the dissemination of scientific information, basic research, the Bureau of Standards, scientific manpower and education, weather modification, and a host of other scientific subjects. Brooks realized that each of these areas had constituencies of varying public interest and support, but he also appreciated the fact that the real glamor subject which excited the most press and public attention was space and the issue of whether America would overtake Russia.

With a good background of long years of service on the Armed Services Committee, and with a veteran staff director who had served on the committee, Chairman Brooks felt very much at home with military issues. He did not hesitate to test and push the new committee's jurisdiction to the point which incited frequent and bitter challenges by Vinson. At first, Vinson was inclined to laugh and snort at "Ole Overton" and the committee which had been created from one of Vinson's ribs, so to speak. But when Brooks began to hold hearings on why the Army wasn't given the green light on the Nike-Zeus anti-ICBM system, Vinson vented his fury at Brooks for clearly violating the jurisdiction of the Armed Services Committee.

The battle between Brooks and Vinson raged on throughout 1959. Taking the position that the best defense was a good offense, Brooks personally dictated a curt letter to Vinson on May 9:

I note from a number of sources that the Special Investigations Subcommittee of the House Armed Services Committee has been holding hearings on the Vega vehicle and on contracts relating thereto and on other phases of space.

Of course, these matters are clearly within the jurisdiction of the Science and Astronautics Committee. This fact shows how easy it is to transcend the jurisdictional lines of committees. I think, however, that I should call this to your attention.

Chairman Vinson was outraged at the charge, and on May 11 he fired back an angry letter intended to put Mr. Brooks in his place with withering words like these:

Obviously, I am unaware of the "sources" to which you refer and upon which you seem to have relied for your sole information. Had either you or your "sources" made an effort to determine the facts before you wrote your letter, I am confident this is one letter that would not have been written.

Vinson went on to document through copies of the Hébert subcommittee transcript that his subcommittee was only inquiring into management of the Atlas booster, and not the NASA-controlled Vega; then unleashed a final swipe at Brooks:

If, in the future, you should feel it necessary, or desirable, to raise this same subject or other related matters, I trust you will extend to me the courtesy of first making inquiry as to the facts before assuming, on the basis of rumor, that this committee has transcended its jurisdiction.

Brooks couldn't resist getting in the last word, and wrote Vinson on May 12 to express his appreciation for the "attitude" of Vinson and Hébert. Then he confessed that one of his sources was *Aviation Daily*.

The running fight between Brooks and Vinson and their respective committee jurisdictions erupted with greater fury at the end of July 1959, when Vinson blasted Brooks with a three-page letter charging again that the Science and Astronautics Committee was invading the jurisdiction of the Armed Services Committee. Vinson pointed to a July 22 Brooks press release announcing that the Brooks committee was inquiring into various aspects of the Atlas and Polaris missiles. Vinson told Brooks that "I fail to find anything within the rules of the House which grant the jurisdiction which you have announced you intend to exercise." Vinson concluded:

I trust that you will find it advisable to reconsider your decision to assume jurisdiction over a subject matter which is clearly within the jurisdiction of this committee. In the event of your unwillingness to accede to this request, it is my further judgment that the matter should be submitted to the Speaker for resolution.

In a masterpiece of understatement, Brooks responded on July 28 that "I believe that a misunderstanding has arisen between us." But he stood his ground. Brooks told his committee, and repeated his statement in response to Vinson, that "this committee was not attempting to poach on the jurisdiction of any other committee." He defended the inquiry into Atlas because it was a booster for the Mercury man-in-space program, and explained that the committee was interested in Polaris because it was concerned with research and development on solid propellants. Brooks then related a little piece of personal history:

You will recall that before leaving the House Armed Services Committee and before accepting the place as Chairman of the House Committee on Science and Astronautics, I came to your office to discuss the jurisdiction of the two committees. * * * At that time you, in substance, assured me that we would have no trouble in establishing jurisdictional lines since your committee with its \$40 billion jurisdiction (the largest in the House) had more jurisdiction than it needed and could use. It has, therefore, given me pleasure to consult with you repeatedly on various matters affecting our committees.

It is a tribute to Chairman Brooks that he barged ahead and refused to be embarrassed in the face of a storm of criticism from many different committee chairmen. Among the most upset was Representative Oren Harris (Democrat of Arkansas), chairman of the Committee on Interstate and Foreign Commerce, who raised the issue on the House floor. Harris objected to hearings by the Brooks committee on communications satellites and their operation. Brooks merely fended off the challenge by insisting that his committee was only inquiring into R. & D., and was not interested in operation.

In some other areas in the first few years, the Science and Astronautics Committee held hearings which seemed to stretch its jurisdiction pretty far. The committee was barely a month old when Brooks asked Ducander to start some new hearings on space food by calling the Department of Agriculture over to testify. The hearings were a disaster in their lack of planning, and almost total lack of any useful information elicited. The Agricultural Research Service gave an extended dissertation on their administrative operations, but had little to offer about space food. The hearing would have completely collapsed had it not been for Congressman Fulton's determination "to spur you on to new ideas and new approaches. * * * We are trying to get you to raise your sights." After getting nothing but wooden responses to his questions, Fulton finally erupted with a question which literally stunned the witness and was long and fondly remembered as the greatest Fultonism of all time:

Possibly in space the approach to vegetables might be different. Did that ever strike you—because we are thinking of three-dimensional vegetables, maybe in space, where you have a lot of sunlight, you might get a two-dimensional tomato. It might be 1 million miles long and as thin as a sheet of paper, aimed toward the sun—a tomato.

There was a long silence, as the Department of Agriculture witness blinked, and finally blurted out softly: "It is an interesting thought." He was completely flabbergasted.

In addition to his jurisdictional fights with other committees, Chairman Brooks had one serious jurisdictional fight which arose within his own committee. Brooks was eager to expand his jurisdiction to cover oceanography, and he fashioned a bill for the development of teaching facilities and aiding graduate students which he managed to get referred to the Committee on Science and Astronautics. But Brooks received an angry reaction from the ranking member of his committee, George P. Miller of California, who also served as chairman of the Oceanography Subcommittee of the Merchant Marine and Fisheries Committee. Miller insisted that jurisdiction over oceanography really belonged to the Merchant Marine Committee. Brooks'

next approach was to set up a Special Subcommittee on Earth Sciences, of which he made himself chairman, and in August issued a special invitation to Miller to sit with the committee.

Rather than acknowledge the jurisdiction of the Science Committee, Miller did not sit as a member of the committee, but appeared instead as a witness at the Brooks hearing on August 25, 1959. There he sparred gently with Brooks, pointing out the work in oceanography which was already underway in the Merchant Marine Subcommittee which he chaired. In turn, Brooks asked for Miller's printed hearings and very courteously stated:

We want to study those so there will be as little overlapping as possible***. There is no need for duplication, because we will develop the whole program of Earth sciences in this particular committee.

On September 1, Brooks tried to persuade Miller with a letter which stated:

It is late in the session to discuss the subject of jurisdiction but I want to assure you that your Committee on Science and Astronautics is going to proceed with the bills before it and I am satisfied no conflict will arise between the Committee on Merchant Marine and Fisheries and the Science and Astronautics Committee. Our viewpoint is scientific, while the Merchant Marine and Fisheries is that of operating the merchant marine and supporting the fish and wildlife of the ocean.

Miller was not mollified. The following year Brooks again scheduled hearings on his bill, this time before the full committee on April 28 and 29. When the Merchant Marine Committee got wind of the hearings, its staff made a vigorous protest to Ducander and indicated that Miller would be upset also at the news. On April 18, Ducander in a memo alerted Brooks that a big storm was brewing, and that he had dispatched Dr. Sheldon to brief Miller, just returned from Geneva:

Accordingly, Dr. Sheldon went to Miller's office the following morning and explained that we were merely setting up a two-day briefing on oceanography, after which Miller became quite angry and said we had no authority to do this. He further told Sheldon that if we persisted in going into the field of oceanography, considering the fact that the Merchant Marine and Fisheries Committee had a Special Subcommittee on Oceanography of which he was chairman, he intended to take the matter up with the Speaker and the House leadership. He further stated to Sheldon that if the hearings went on as scheduled, he would be present at the hearings, and publicly protest this committee's unwarranted usurpation of the Merchant Marine and Fisheries Committee's jurisdiction.

The hearings went ahead, as scheduled, and Miller was an active participant. The hearings were published under the title of "Frontiers of Oceanic Research." But Brooks did not venture again into the deep and turbulent waters of oceanography. The Subcommittee on Earth Sciences became moribund and held no more hearings during Brooks'

tenure. The sequel to the story is that when George Miller moved up to the chairmanship of the Science and Astronautics Committee, he did not sanction any activity in the field of oceanography either.

ESTABLISHMENT OF SUBCOMMITTEES

On January 26, 1959, a few days after the organization of the committee, Chairman Brooks sent out memos to all members asking their personal preferences on which of four subcommittees they would like to serve:

Scientific Training and Facilities, No. 1.

Scientific Research and Development, No. 2.

International Cooperation and Security, No. 3.

Space Problems and Life Sciences, No. 4.

The replies of the members had barely started to come in when Chairman Brooks started an intensive series of morning and afternoon hearings of the full committee which summoned NASA, National Science Foundation, the military services, Department of Agriculture, National Bureau of Standards, private industry, and many other witnesses. These full committee hearings made it impossible for the subcommittees to operate.

Brooks tapped the four senior committee members to head the respective subcommittees, as follows:

No. 1, Representative George P. Miller, California.

No. 2, Representative Olin E. Teague, Texas.

No. 3, Representative Victor L. Anfuso, New York.

No. 4, Representative B. F. Sisk, California.

Chairman Brooks also set up a Special Investigations Subcommittee, making himself chairman. George Miller was made chairman of another subcommittee to make recommendations on and exercise oversight over the National Bureau of Standards. Toward the close of the summer, Chairman Brooks also made himself chairman of a Subcommittee on Earth Sciences. Finally, he formed a Special Subcommittee on Patents and Scientific Inventions, which did not begin work until August 1959, and was chaired by Representative Erwin Mitchell of Georgia.

The four chairmen of the numbered, permanent subcommittees soon discovered that it was impossible for them to organize and operate with any independence and responsibility. For 2 months, they protested the fact that Brooks was arrogating to himself all the power, and delegating none of the responsibility. As the protests mounted, Brooks would hand out new assignments—as, for example, the special subcommittee to investigate whether the Soviet Lunik was a hoax. Congressman Anfuso was assigned to chair a special ad hoc subcommittee on the subject.

NASA AUTHORIZATION IN 1959

When NASA sent up its budget, Brooks again went into full committee hearings. Then he very quickly divided up the NASA authorization into four parts, assigning construction of facilities to the Miller subcommittee, splitting research and development down the middle for the Teague and Sisk subcommittees, and giving salaries and expenses to the Anfuso subcommittee. With a grand rush, he gave the four subcommittees a week from April 24 to comb over the NASA budget and make their recommendations to the full committee. It was murderous work, but it certainly kept Chairman Brooks insulated from criticism from the senior members, temporarily at least.

The Miller subcommittee was the only one which acted to change an item during the race to analyze the authorization in 1959. The Miller subcommittee knocked out a \$4,750,000 NASA-requested item for a research facility for high energy solid and liquid rocket propellants. The subcommittee quite correctly argued that NASA didn't have the foggiest notion where the site was to be located. "It doesn't hurt to serve notice that we are going to be very vigilant in watching what they are doing," Miller reported to the full committee in executive session. The committee approved the cut, the cut was sustained by the House, but NASA subsequently made a special appeal to the Senate and got the cut restored in conference.

Teague's role in the early subcommittee hearings was to pound some clarity and simplicity into NASA's high-blown, abstruse language. At the very first meeting of his subcommittee on April 24, 1959, Teague opened an executive session with NASA officials by pointing out that he had spent until 1 a.m. the night before poring over the backup books, and he just wished NASA would try to present their program in everyday language:

You know a lot of people come before Congress and if they can word things in a way that nobody can understand, they think maybe it will be better. In NASA's case the simpler the language and the more explanatory it can be, instead of using words that 99 percent of the Members won't know—I think you will be a lot better off.

Dr. Hugh Dryden, the veteran and brilliant Deputy Administrator of NASA, who had graduated from college as a boy genius at the age of 17, protested: "This is a difficulty with any highly technical subject, to state it in terms that the ordinary person understands." Teague shot back:

But I do think, Dr. Dryden, that the language could be simplified a whole lot, so that somebody who takes this and reads it will know more about it than I knew when I got through reading it. There are just so many technical terms. * * * Many of them aren't in the dictionary.

Again in 1960, Teague told the witnesses that he wanted them to present their programs in a way that could easily be explained to other Congressmen on the floor:

These are complicated programs, and we need their explanation in layman's language. I would like you to prepare what you would say to somebody on the floor who has heard none of the technical hearings, and knows little about it. Otherwise there is a good chance before this is over that you will get cut in appropriations.

It is instructive to read the record of the growing sophistication of the subcommittees and their members, as each year progressed. When the first budget hearings were held in 1959, almost everything had to be accepted on faith. But as the years went by, fortified by intimate knowledge drawn from field inspections, excellent staff investigation, and private conversations with field officials or private industry representatives out on the firing line, the subcommittees took more initiative in reviewing the budgets of agencies under their jurisdiction.

Late in 1959, Chairman Brooks decided to make another move to change the general jurisdiction of the four permanent subcommittees which in January had been given subject-matter titles. On December 15, he wrote to every member of the committee, and used a very persuasive argument to support his desire to do away with the subject-matter titles and simply give numbers to the subcommittees, retaining the same chairmen. His December 15 letter explained it by arguing this way:

By now it has become apparent that the jurisdiction of the committee far exceeds the functional titles which have been allotted to the subcommittees. As a result, it has become necessary to handle different matters because the subject did not properly come within the jurisdiction of the subcommittees originally appointed. If we would merely use numerical subcommittees, each subcommittee could be expected to have considerable additional jurisdiction without being bound by its present functionalized title and jurisdiction.

As a matter of fact, I have checked into this matter, and I find that other committees, such as the Armed Services Committee, have also found it best to use numerical subcommittees rather than limiting the jurisdiction of subcommittees to their titles.

Chairman Brooks solicited the responses of all members of the committee, slipping in the phrase at the end of the letter: "In the absence of serious objection I plan to put this program into effect in the near future." Perhaps it was the spirit of good will of the Christmas season. Perhaps it was the large number of "it makes little difference to me" responses the chairman received from many members. But when the committee convened in January 1960, Chairman Brooks could report that an overwhelming majority of his committee had endorsed the idea, so it became a *fait accompli*.

ANNUAL AUTHORIZATION

As noted in chapter I, Senator Lyndon Johnson in 1958 inserted an amendment requiring annual authorizations for NASA. However, the powerful opposition of Representative Gerald R. Ford and others had forced a compromise limiting the requirement to one year. Now Chairman Brooks took the leadership to extend the annual authorization requirement—thus insuring that the Committee on Science and Astronautics would have a powerful oversight weapon which by precedent became permanent. In a dramatic presentation to a May 6, 1959, executive session of the committee, Brooks termed his annual authorization amendment—

the crux of the whole thing, the important thing that we have to battle for. * * * this is a vital section * * * you are blazing a path and you want to look ahead at the type of work they do in development. * * * what we want to do is to bring them back year by year for the next few years until they become an established agency and we have fashioned a program.

Teague commented immediately: "Mr. Chairman, I am going to be for your amendment." After a little discussion, the amendment passed.

It was perhaps lucky for the Science and Astronautics Committee that when the authorization bill hit the floor on May 19, 1959, it came up under suspension of the rules which barred any amendment. To many of the members of the Science and Astronautics Committee, it was outrageous to bring out their first authorization bill with only 40 minutes of debate allotted under suspension of the rules. To be sure, they were only authorizing \$480,550,000 that first year—less than 10 percent of the high watermark of funding for NASA through most of the 1960's. But here was a great chance to educate all the Members of the House and the time limitation was cruelly constricting.

Under the circumstances, however, the leadership had to reckon with the mood of the House which in 1958 had soundly rejected the annual authorization concept by a whopping 236-126 margin. The same cast of characters, led by Congressman Ford, were sharpening their weapons to try and remove the requirement for annual authorization.

When the bill came onto the floor on May 19, the Brooks forces caught their opposition napping. The opponents were entitled to control 20 minutes of the 40-minute debate if they had been alert enough to "demand a second" when the Speaker asked at the outset: "Is a second demanded?" But they were really asleep at the switch. Congressman Gordon McDonough of California, a member of the Science and Astronautics Committee and strong supporter of the bill, grabbed the microphone and claimed the time before the opposition realized it was being

stolen from under their noses. But although McDonough controlled the time, he graciously yielded to Ford to make his pitch.

Once again, Ford spoke eloquently against annual authorizations. He pointed to his work on the select committee, and how he had worked to draft the Space Act setting up NASA. He charged that the authorization process would slow down the space program since —

time is of the essence if the United States is to move forward in space competition with the Soviet Union. * * * I doubt if it is necessary to have a complete and total authorization each year plus a review by the House and Senate Committees on Appropriation.

Ford was joined by a new ally, Representative Albert Thomas of Texas, who in 1958 had argued on the other side in favor of the annual authorizing power. Thomas told Brooks that "I am sure that my able, congenial, and distinguished friend realizes that he is departing from the normal procedure in the House." The atmosphere became tense. Needing a two-thirds vote to pass the bill, the leadership wasn't quite sure it had the horses. When the debate finished, the bill was pulled from the floor and a 24-hour delay imposed while votes could be rounded up.

It wasn't an easy task to get a two-thirds majority against the powerful opposition of the entire Appropriations Committee, led by opponents like Clarence Cannon, George Mahon, Gerald R. Ford, and a coalition of conservatives such as John Rhodes, William Colmer, and Howard Smith and liberals like Wright Patman and Hale Boggs. But the Science and Astronautics Committee won the day by a vote of 294-128.

The principle of true oversight and annual authorization was now embedded in the power of the new committee.

PANEL ON SCIENCE AND TECHNOLOGY

The long parade of witnesses from in and out of the Government who appeared before the Science and Astronautics Committee during 1959 came in response to a specific summons from Chairman Brooks, and their testimony covered a wide variety of issues which the committee identified as important, timely, and useful. Special consultants were available to address specific problems when needed. But it soon became apparent to thoughtful members, the staff, as well as to the chairman, that there were many immediate and long-range problems which were recognized by farsighted scientists and engineers but which were not reaching the Congress soon enough for constructive action.

In February 1959 Chairman Brooks first mentioned to Dr. James A. Van Allen the concept of a panel of scientists and engineers, plus other objective individuals in the field, who could advise or meet with the

committee. After a number of exploratory talks, Chairman Brooks wrote to the heads of the three key agencies over which the committee had jurisdiction—NASA, the National Bureau of Standards, and the National Science Foundation. Identical letters went out on September 25, 1959, to Dr. T. Keith Glennan, Dr. Allen V. Astin, and Dr. Alan T. Waterman. In the letters, Brooks mentioned that 1959 had been spent on the regular authorization bills and oversight, spot investigations plus "special attention to the problems of clarifying the jurisdiction of the committee within the congressional structure." He added:

Now I would like to move into our second year with more attention to an orderly program of work, keyed to the most urgent scientific needs of the country where public policy questions are involved.

Brooks asked the three agency heads to nominate about a dozen outstanding scientists and engineers with some attention both to specialties and experience, as well as geographic and institutional distribution.

The objective and mode of operation were stated in this way:

Such a panel might meet once or twice a year to offer its suggestions on programs particularly in need of congressional study, and might also serve on an ad hoc basis to give other recommendations if this committee has questions for them.

I would like to see a closer tie develop between the Congress and the scientific community, and it seems to me that this might be a good starting place.

Based upon the list of names submitted, the first batch of letters inviting these distinguished individuals went out on December 15, 1959. On January 12, 1960, Chairman Brooks aired the concept more formally in an executive session of the committee, soliciting additional suggestions from the members. The committee was enthusiastic in its support of the idea, and made a number of recommendations on those to be invited.

On January 17, Chairman Brooks publicly announced the members of the panel:

Dr. Edward J. Baldes—biophysics—senior consultant in biophysics, Mayo Clinic, Rochester, Minn.

Dr. Clifford C. Furnas—chemical engineering—chancellor, University of Buffalo, Buffalo, N.Y.

Martin Goland—applied mechanics—Southwest Research Institute, San Antonio, Tex.

Prof. W. Albert Noyes, Jr.—general chemistry—University of Rochester, Rochester, N.Y.

Dr. Clarence P. Oliver—genetics and zoology—University of Texas, Austin, Tex.

Dr. Sverre Pettersen—meteorology—professor of meteorology, University of Chicago, Chicago, Ill.

Dr. Roger Revelle—geophysics and oceanography—director, Scripps Institution of Oceanography, University of California, La Jolla, Calif.

- Prof. Richard J. Russell—geology—Louisiana State University, Baton Rouge, La.
Dr. H. Guyford Stever—aeronautical engineering—Massachusetts Institute of Technology, Cambridge, Mass.
Prof. James A. Van Allen—nuclear physics, cosmic rays—University of Iowa, Iowa City, Iowa.
Prof. Fred L. Whipple—astronomy—director, Astrophysical Observatory, Smithsonian Institution, Cambridge, Mass.
Prof. Maurice J. Zucrow—jet propulsion—professor of engineering, Purdue University, Lafayette, Ind.
Dr. Lee A. DuBridge—physics—president, California Institute of Technology, Pasadena, Calif.
Dr. Thomas F. Malone—meteorology—director of research, Travelers Insurance Companies, Hartford, Conn.

On March 25, the Panel on Science and Technology held its first meeting in the Whittall Pavilion of the Library of Congress. The main reason for holding the meeting in the Library was to get away from the atmosphere of the committee room which would put the panel members in the position of being witnesses rather than advisers.

At that meeting, Chairman Brooks sketched in the history of the select committee and the standing committee and their accomplishments. He noted that the committee, in examining ways to "increase the effectiveness of the committee commensurate with the challenge of the times," had decided to call on the panel and "set a pattern of cooperation between the scientific and technical community and the people's Representatives in the Congress of the United States."

In announcing the establishment of the new panel, Brooks stated,

We shall provide for these men of science a forum in which they can speak out to the world on the problems that face it in basic and applied science, in space technology, and in space exploration.

It is unfortunately true that too many times scientists with important ideas that would help advance the interests of the United States and mankind in general have been unable to find anyone to listen to them. Theirs have been, on too many occasions, voices in the wilderness.

Now, through this panel, we shall make available to them a public forum in which they can be heard.

At the first meeting of the panel, Martin Goland, president of the Southwest Research Institute in San Antonio, Tex., presented a paper on energy conversion and also prospects for the marginal or secondary recovery of petroleum. Dr. Sverre Petterssen, professor of meteorology at the University of Chicago, delivered a paper on "Expected Developments in Meteorology During the Coming 10-Year Period." Both papers helped sketch in future developments with which the committee later became involved, in the areas of energy research and the development of weather satellites.

In his remarks at the first panel meeting, Dr. James A. Van Allen, of the University of Iowa, provided some of the stimulus for committee

support of NASA's sustaining university program, as well as the efforts of the National Science Foundation. Dr. Van Allen told the committee:

Industry, for the most part, delivers what we might call tangible products. Universities, on the other hand, deliver a product which is much less tangible. I think I might say that our product, in idealized form, consists of competent, enthusiastic, and tough-minded young men and women who are devoted to a life of study and a life of inquiry. I may say that our product is in very great demand. It is not clear to me that the Federal Government recognizes the value of our product in a way which I think it deserves. * * * Consideration might well be given to the idea of what one might call lump subsidies to general scientific areas within universities.

The concepts outlined helped furnish some of the ammunition which the committee effectively used to support NASA and NSF programs of university support for research and the training of scientists and engineers.

The first panel meeting was so successful that the committee hastened to schedule another meeting in June of 1960. This time the panel met for two days, on June 2 and June 3, enabling fuller discussion of the issues presented. Although the meetings were held in the regular committee room in 214-B of the Longworth Building, Chairman Brooks introduced the meeting by observing:

We are sitting here today in this special meeting situation, not in any sense a formal committee hearing. For this reason I have interspersed members of both the committee and the panel in these seats, not in accordance with any concept of seniority, but just as is convenient as people arrive. This is to help preserve the atmosphere of free exchange of ideas on both sides.

At the second panel meeting, a number of additional papers were presented on the need for extended geologic research, studies of the lunar surface, radio astronomy, micrometeorites, the need for national research planning, the interrelation between the Earth sciences and space sciences, scientific education in the Soviet Union, world population growth, desalinization of water, and minerals research.

Representatives Miller and Fulton, who were deeply interested in pushing forward America's progress toward the metric system, raised the issue during the second panel meeting. Dr. Richard J. Russell, acting dean of the Graduate School at Louisiana State University, in boosting the metric system, noted that one of the reasons arithmetic was difficult for so many school pupils was that "our whole system has this millstone around its neck, of the obsolete system of weights and measures." Considerable encouragement and support was given to the committee by the panel members, stimulating action on legislation introduced by Chairman Miller to move toward establishment of the metric system in the United States. At the fourth meeting of the panel on March 21-22, 1962, the panel formally endorsed the establishment of a metric system of measurements in this country.

Three more sessions of the panel were held during 1960 and 1961 under Brooks' chairmanship, and 10 sessions were held in the 11 years from 1962 through 1972 under Miller's chairmanship. Down through the years, the following topics were discussed at the panel sessions:

Mapping and Geodetic Satellite Programs,
Advanced Propulsion for Space,
International Scientific Activities,
European Organizations for Space Research,
Availability of Scientific Advice to Congress,
Aeronautics,
Application of Science and Technology to Economic Growth,
Government, Science and International Policy,
Data Processing,
Transportation and Communication,
Science and Technology in Latin America,
Modern Evolution of Science and Technology in Japan,
Applied Science and World Economy,
Utilization of Scientific and Technical Resources in Canada,
Science, Technology and the Cities,
Management of Information and Knowledge,
Forces for Change in the Seventies and Eighties,
Education in Post-Industrial America, and
Earth Resources Satellites.

The meetings of the panel were always accompanied by informal receptions at which members of the panel, invited guests, members of the committee, and other Members of Congress had an excellent opportunity to exchange ideas in a relaxed atmosphere. The invited guests included not only governmental officials, but also representatives from industry, labor, universities and research organizations, and specialists interested in the topics under consideration. The committee "flower fund," built up through assessing the members \$10 or more apiece, was insufficient to cover the cost of receptions and luncheons for the visiting dignitaries. Aerospace contractors occasionally hosted luncheons of the National Space Club which coincided with the panel meetings, and helped cover the cost of social affairs which included the panelists at Capitol Hill gatherings.

Chairman Brooks originally envisioned that about 16 panelists would be appointed, with about 5 or 6 new members of the panel to come in each year, on a rotational basis. Brooks' death intervened following the third panel meeting, and his concept of panel rotation was not carried into effect until the late 1960's.

Starting with the March 21-22, 1962 panel meeting—the first under Miller's chairmanship—the concept of panel moderators was started. Chairman Miller designated as guest moderators, Dr. George B. Kistiakowsky, former Science Adviser to President Eisenhower, for

the March 21 meeting and Dr. Harrison S. Brown, professor of geology at the University of California, for the March 22 meeting. Also taking part as a guest participant was Sir Bernard Lovell, director of the Jodrell Experimental Station in England.

Chairman Miller introduced a new organizational idea for the panel, starting in 1965, by devoting the panel discussions to a central theme. The topic of the 1965 meeting was "Aeronautics." At the same time, Chairman Miller persuaded Prof. Luigi Broglio, chairman of the Italian Space Commission for the National Council of Research, to serve as guest panelist. The guest moderators for the January 26-27, 1965 panel meeting were Prof. René H. Miller, Slater professor of flight transportation at the Massachusetts Institute of Technology, and Dr. Edward C. Welsh, executive secretary of the National Aeronautics and Space Council.

Most participants favored the "central theme" concept introduced by Chairman Miller in 1965. The multiple-subject agendas used for the earlier panel meetings provided a fascinating and free-wheeling opportunity for everybody to pitch in and sound off on any subject, resulting in great freedom but little continuity. The new structure allowed more time for discussions in depth, and the subject of the discussions unfolded more logically with the skillful guidance of the panel moderators.

Another interesting twist was introduced by Chairman Miller at the 1965 panel meeting: over 150 prominent persons representing Government, industry, and the scientific and academic communities attended at Miller's special invitation. For the first time, audience participation was encouraged. This served to broaden the discussion, but of course made the interchanges between committee and panel members somewhat less intimate in nature. However, the social opportunities for panel and congressional personnel to get together in between these formal sessions obviated this difficulty.

As noted in chapter V, Representative Daddario, as chairman of the Subcommittee on Science, Research and Development, helped organize and shared top billing at several of the panel meetings, starting with the 1965 session. The 1965 panel meeting was also unique in that it was the first use of the new committee quarters in the spacious room 2318 of the Rayburn Building.

Under Chairman Miller's leadership the keynote speakers, guest moderators, and guest panelists constituted a stellar array of talent, including:

Vice President Hubert H. Humphrey.

Lord Snow, British Ministry of Technology.

Gerard Piel, publisher, Scientific American.

Hon. Dean Rusk, Secretary of State.

Robert Major, director, Royal Norwegian Council for Scientific and Industrial Research, Norway.

Dr. Kankuro Kaneshige, member, Council for Science and Technology, Japan.

Dr. H. W. Julius, chairman, Central Organization for Applied Scientific Research, the Netherlands.

Dr. Donald F. Hornig, Director, U.S. Office of Science and Technology.

Dr. S. Husain Zaheer, chairman, National Research Development Corporation of India.

Dr. C. Chagas, president, Brazilian Academy of Sciences.

Lady Jackson (Barbara Ward), Foreign Affairs Editor, "The Economist," London.

Dr. O. M. Solandt, chairman, Science Council of Canada.

Dr. Jorge A. Sabato, National Commission for Atomic Energy, Buenos Aires, Argentina.

Hon. George D. Woods, president, International Bank for Reconstruction and Development.

André de Blonay, secretary general, Interparliamentary Union, Switzerland.

Dr. Philip Handler, Chairman, National Science Board.

Dr. Alexander King, Director for Scientific Affairs, Organization for Economic Cooperation and Development, France.

Hon. John W. Gardner, former Secretary of Health, Education, and Welfare, and chairman of the Urban Coalition.

Constantinos A. Doxiadis, president, Athens Center of Ekistics, Athens, Greece.

Richard Llewelyn-Davies, professor of architecture, University of London.

Zivorad Kovacevic, secretary general, League of Yugoslav Cities, Belgrade, Yugoslavia.

McGeorge Bundy, president, Ford Foundation.

Hon. Earl Warren, retired Chief Justice of the United States.

Daniel J. Boorstin, Director, National Museum of History and Technology, Smithsonian Institution.

Don K. Price, dean, Graduate School of Public Administration, Harvard University.

Osmo A. Wiio, Helsinki University, Finland.

Ioan D. Stancescu, counselor, National Council of Scientific Research, Rumania.

Hon. William P. Rogers, Secretary of State.

Dr. Adriano Buzzati-Traverso (Italy), UNESCO.

Prof. Abdus Salam (Pakistan), International Centre for Theoretical Physics.

Dr. Viktor A. Ambartsumian (U.S.S.R.), International Council of Scientific Unions.

Prof. Thomas Odhiambo, International Centre of Insect Physiology and Ecology, Nairobi, Kenya.

Hon. Staffan Burenstam Linder, Member of Parliament, Stockholm, Sweden.

Capt. Jacques-Yves Cousteau, Centre d'Études Marines Avancées, Marseilles, France.

Dr. Edward E. David, Jr., science adviser to President Nixon.

Dr. James C. Fletcher, Administrator, NASA.

Dr. Robert M. White, Administrator, National Oceanic and Atmospheric Administration.

Dr. Fernando de Mendonça, general director, Instituto de Pesquisas Espaciais, Brazil.

Dr. Franco Fiorio, chairman, United Nations Working Group on Remote Sensing of the Earth by Satellites, Italy.

Dr. Norman Fisher, chairman, Australian Committee on Earth Resources Satellites, Australia.

Armin Spaeth, Ministry of Science and Education, Germany.



Among the members of the committee's advisory Panel on Science and Technology were the following: Front row, from left, Dr. Athelstan Spilhaus, Dr. Harrison S. Brown, Dr. Lee A. DuBridge, Dr. Clifford C. Furnas, and Dr. Fred L. Whipple. Rear row, Martin Goland, Dr. Richard J. Russell, Dr. Maurice J. Zucrow, Dr. W. Albert Noyes, Jr., Dr. James A. Van Allen, and Dr. H. Guyford Stever.



Among those taking part in sessions of the Panel on Science and Technology were Representative George P. Miller (Democrat of California), left, Dr. Harrison S. Brown, Dr. Roger Revelle, and Dr. Robert C. Seamans, Jr., of NASA.

During the early sixties, several personnel changes occurred in the panel's permanent roster. Dr. Sverre Petterssen resigned in 1963, and Dr. Harrison S. Brown of the California Institute of Technology and Dr. Walter J. Hesse of Ling-Temco-Vought Corp. were added, bringing the total membership to 15. Dr. Clay P. Bedford of the Kaiser Aerospace and Electronics Corp. was appointed in 1966. In 1967, Dr. Clarence P. Oliver resigned and was replaced by Dr. Athelstan Spilhaus, president of the Franklin Institute of Philadelphia, Pa.

By 1968, it was felt that some new blood should be infused into the panel. It was concluded that perhaps some of the charter members of the panel, although ideally oriented toward the needs and challenges of the early sixties, did not in some instances perform as effectively in the disciplines and areas most needed by the committee in the seventies. It was also felt that there was some repetition in the views advanced by some panelists. Chairman Miller, supported by Representative Daddario, became convinced that the panel process would be enriched by the rotation of some of its members. As a result, the full membership of the permanent panel by 1972 included the following:

- Dr. Ivan L. Bennett, Jr.—medicine—New York University.
- Dr. Harrison S. Brown—geochemistry—California Institute of Technology.
- Dr. A. Hunter Dupree—history—Brown University.
- Dr. David M. Gates—ecology—University of Michigan.
- Mr. Martin Goland—applied mechanics—Southwest Research Institute.
- Dr. Walter J. Hesse—aircraft and missile systems—LTV Aerospace Corp.
- Dr. Herbert E. Longenecker—biochemistry—Tulane University.
- Dr. Thomas F. Malone—meteorology—University of Connecticut.
- Dr. Roger Porter—microbiology—University of Iowa.
- Dr. William F. Pounds—management—Massachusetts Institute of Technology.
- Dr. Roger Revelle—geophysics—Harvard University.
- Dr. Athelstan Spilhaus—oceanography—Woodrow Wilson International Center for Scholars.
- Dr. H. Guyford Stever—aerospace engineering—Carnegie-Mellon University.
- Dr. James A. Van Allen—physics—University of Iowa.
- Dr. Fred L. Whipple—astronomy—Smithsonian Astrophysical Observatory.
- Dr. John T. Wilson—psychology—University of Chicago.

The panel members and guest panelists were reimbursed for their transportation and subsistence expenses, plus a consultant fee of \$50 per day for the period of the panel meetings.

Months of advance planning preceded the meetings of the panel. In addition, the activities of the committee on the subject matter of the panel never ended with the rap of the gavel which marked the formal termination of the sessions. For example, following the 1969 panel meeting on "Government, Science and International Policy," the committee undertook follow-on studies on U.S. policy regarding scientific relationships with other countries. Panelists Harrison S. Brown

and Roger Revelle were joined by Dr. Philip Handler, Chairman of the National Science Board, as a steering committee. This steering committee assisted the committee in assembling and assessing information from 11 Federal departments and agencies, analyzing their international science programs, the limitations and potentialities of each, the funding, problems, and possibilities. Similar activities preceded and followed most of the panel sessions on a wide variety of topics of concern to the committee.

In summary, the panel during its operation helped develop a background of scientific, technical, and policy information for the committee which was authoritative, timely and candid. One of the useful by-products of the interchanges was the improved understanding by scientists, both American and from other nations, of the legislative process and the manner in which Congress and the Science Committee operated with respect to science and technology. The panel sessions helped to identify spheres of scientific and technological research which offered exceptional promise for the welfare and security of the Nation, and which needed legislative attention. The committee was exposed to updated methods of conducting research, and the assembling and analysis of data by modern means. Also, the committee through the panel meetings received updates on issues such as the availability of scientific manpower and educational or training needs; international cooperation and organizations concerned with science and technology; and a general appraisal and assessment of the priorities being followed in the committee's work.

Naturally, the information and inspiration provided through the panel sessions had differing influences on the various members. Certainly the ease of the dialogue enhanced the mutual respect between Congressmen and the scientific community.

The final meeting of the Panel on Science and Technology—the 13th—took place in a three-day span, January 25-27, 1972. The number 13 proved unlucky because the panel did not meet after that date. Various reasons have been advanced for the abandonment of the panel meetings after 1972. Under Chairman Miller, the panel concept developed to its fullest flower, and when Miller left the House of Representatives in 1972 the panel lost its greatest champion. In addition, Representative Daddario shouldered a vast amount of the burden of arranging, moderating, and providing leadership for the panel, and with his departure in 1971 another strong supporter and active worker was lost. There is no question that the amount of staff time devoted to arranging and following up on the panel meetings constituted a heavy drain away from other duties. Some unfavorable publicity was generated through the contributions of aerospace contractors toward the lunches and receptions for panelists and their guests.

The record indicates that prior to becoming chairman, Representative Teague was not a frequent participant in the panel discussions. Chairman Teague felt that the ongoing work of the committee should not be in any way delegated to those on the outside. Although a vast amount of work and effort went into general receptions enabling the committee to meet with scientists, engineers, astronauts, and those associated with the space program and other activities of the committee, the formal sessions of the Panel on Science and Technology were not revived after 1972.

THE PASSING OF THE SCEPTER

Although not a completely well man, Overton Brooks kept up a supercharged schedule during the 2½ years that he chaired the House Committee on Science and Astronautics. Under his chairmanship, the new committee became firmly established, staffed, tested, and expanded to the limits of its jurisdiction, produced a plethora of studies and reports of high quality, earned the respect of the scientific community, served as a sounding board for the public in new and challenging areas, fully established the principle of annual authorizations by law which was an essential tool for oversight, and helped educate all Members of Congress in the complex fields of science and space.

In 1960, the McNaught Syndicate presented to the House Committee on Science and Astronautics the Holmes Alexander Award as the "House Committee of 1960." The award noted that:

This committee has distinguished itself by its inspiring work in the sciences, in space exploration and in astronomical research. * * * The committee, established in January 1959, is the only committee with jurisdiction over science in general in addition to space. The devotion of the Members to the activities of this committee has been inspiring to behold.

Although Chairman Brooks met some angry opposition from other committee chairmen who felt the fledgling committee was infringing on their jurisdiction, he had a powerful ally in the leadership in Majority Leader John W. McCormack, the chairman of the original select committee who remained on the standing committee through most of Brooks' tenure. When Brooks wrote McCormack in mid-December 1959 to ask his opinion about changing the subcommittees, McCormack, in a typical response, said simply: "I will follow your leadership." Other committee chairmen and executive branch officials who threatened to go over Brooks' head to Speaker Rayburn soon found out that John McCormack was in the doorway.

After the very strenuous sessions of 1959, 1960, and 1961, Brooks finally entered Bethesda Naval Hospital for a long-dreaded operation in August 1961. His gall bladder was removed, and it was decided to

allow him to recover his strength before a further operation. His staff director, Charles Ducander, visited the hospital every morning and, at Brooks' insistence, brought him sheafs of committee papers. Several days later, Brooks called Ducander and asked him to visit him at his home. Surprised that Brooks was out of the hospital that fast, Ducander was even more surprised when he found Brooks at home, fully dressed and lying down on a sofa downstairs. "He had big piles of papers, correspondence he was going through—congressional work, some committee matters I had brought out for him to read. And just about 5 or 6 days from then, he had a heart attack and he died."

Chairman Brooks died on September 16, 1961.

The changing of the guard occurred smoothly. Congressman George P. Miller of California moved up to become chairman of the House Committee on Science and Astronautics on September 21, a position he held until Congressman Olin E. "Tiger" Teague became chairman in January 1973.



White House meeting of space leaders. From left: James E. Webb, NASA Administrator; Senator Robert S. Kerr (Democrat of Oklahoma), chairman of Senate Committee on Aeronautical and Space Sciences; President John F. Kennedy, Vice President Lyndon B. Johnson, Chairman Overton Brooks, and Edward C. Welsh, Chairman of National Aeronautics and Space Council.



While chairman of the Manned Space Flight Subcommittee, Representative Olin E. Teague (Democrat of Texas), right, took his subcommittee on frequent trips to oversee the work at NASA installations and their contractors. Along with Representative Edward J. Patten (Democrat of New Jersey), left, Teague is conferring with James S. McDonnell, head of McDonnell Aircraft Corp. in St. Louis, Mo., producers of the Mercury and Gemini space capsules.



Dr. Werner von Braun and Representative James G. Fulton (Republican of Pennsylvania), right, inspecting a Saturn engine used in the Apollo program.

Racing for the Moon

The members of the Committee on Science and Astronautics were easy to spot, even though they were scattered throughout the crowded chamber of the House of Representatives early on the afternoon of May 25, 1961. They applauded long and loudly when President Kennedy suddenly announced to a joint session of Congress the bold commitment "to achieving the goal, before this decade is out, of landing a man on the Moon and returning him safely to Earth."

The ranking Republican on the Science Committee, Representative James G. Fulton of Pennsylvania, was applauding so vigorously that a press gallery occupant pointed down at him and remarked to a fellow newsman: "They must make a lot of space vehicles in Pittsburgh." For Senator Kenneth B. Keating (Republican of New York), who had served on the select committee, President Kennedy's address was "an alarm clock to awaken the Nation."

Up until the moment the dramatic announcement was made, there had been considerable argument over the feasibility of the goal both within the executive branch and in Congress. In the committee publication "The Next Ten Years in Space, 1959-1969" written by the select committee, but approved and released by the standing committee in 1959, many scientists, engineers, and military men had focused on the timetable for a manned flight to the Moon.

The committee itself was clear and specific in its recommendation contained in its July 5, 1960 report entitled "Space, Missiles, and the Nation":

A high priority program should be undertaken to place a manned expedition on the Moon this decade. A firm plan with this goal in view should be drawn up and submitted to the Congress by NASA.

There was a tug-of-war going on within NASA and also among scientists generally. When the seven newly chosen Mercury astronauts first appeared before the Science Committee on May 28, 1959, Representative J. Edward Roush (Democrat of Indiana) asked Gus Grissom whether he was thinking beyond the preliminary suborbital and Earth-orbiting flights. Grissom immediately answered:

Surely. We have thought in terms of extending this on out further—to the Moon and other planets—but there has to be a first step and we feel this is the first step.

If there were one persistent note which the committee repeatedly sounded in 1959 and 1960, it was the need for a greater sense of urgency. Officially, NASA drew back from an early and firm commitment. When Richard E. Horner, Associate Administrator of NASA, appeared before the Science and Astronautics Committee on January 28, 1960, his official view of the manned Moon flight timetable was very modest:

It appears to be clear, from a careful analysis of launch vehicle requirements as we now understand them, and recognizing the need for information yet to be developed, that a manned landing on the Moon will fall in the time period beyond 1970.

This timetable was not good enough for the Science and Astronautics Committee. On December 30 and 31, 1959, two of the most articulate committee supporters of the manned space flight program, Representatives Olin E. Teague of Texas and Emilio Q. Daddario of Connecticut and staff visited several space industries, including Chance Vought Corp. On that occasion and subsequently, Vought Astronautics, a division of Chance Vought, made a presentation to the committee and staff which they contended "could place a manned expedition upon the Moon in 8 years, by 1968, if the effort were begun immediately."

KEITH GLENNAN

Dr. T. Keith Glennan, the first NASA Administrator, was the sparkplug in pushing the first manned flight program—Project Mercury—and toward that end he had the fullest support of President Eisenhower. "It would be no exaggeration to say that the immediate focus of the U.S. space program is upon this project," Glennan told Congress early in 1960. But Glennan had a strikingly unemotional attitude toward the lunar program which contrasted sharply with his successor, James E. Webb, and repeatedly caused clashes with the Committee on Science and Astronautics. Although the committee respected Glennan's professional knowledge and general administrative abilities, they felt impelled to prod, push, and occasionally berate Glennan for his somewhat casual attitude toward the speed of the space program.

A clue as to Glennan's inner feelings is contained in a private memoir he wrote for his family, quoted by Presidential Science Adviser James R. Killian, Jr., which confesses:

I had taken no more than casual interest in the efforts of this Nation to develop a space program following the successful orbiting of Sputnik I by the Russians on October 4, 1957.

Killian himself was somewhat blunter in his own attitude: "I would be less than candid about the role I played if I did not make clear my lack of enthusiasm for some of our man-in-space projects and for the manned lunar program." Like a good soldier, Glennan was

reflecting the feeling of his administrative superiors, especially President Eisenhower.

Repeatedly, the committee tried to get Glennan to admit that if he had more money for different aspects of the space program, then NASA could perform its various missions faster. Chairman Brooks, in opening "space posture" hearings on January 20, 1960, made a sharp and challenging assertion:

Those of us on this committee would be indulging in fanciful thinking if we did not admit to ourselves that the U.S. space effort has reached neither the pace nor the proportions we had hoped for when we passed the National Aeronautics and Space Act in July 1958. Perhaps we expected too much. But there are definite indications—these have existed some time—that a true sense of urgency has not constantly attended the American space program.

THE SPACE RACE

To focus attention on the importance of speedier and more significant forward progress, the committee called Livingston T. Merchant, Under Secretary of State for Political Affairs, and George V. Allen, Director of the U.S. Information Agency. Allen testified that "It is hardly an overstatement to say that space has become for many people the primary symbol of world leadership in all areas of science and technology." Merchant underlined the obvious point that "the performance of the United States and the Soviet Union in outer space will inevitably be compared by the rest of the world." The committee made no bones of the fact that the forum of the committee hearing, well covered by the news media, was being utilized as a sounding board to spur a higher level of activity by both the administration and NASA.

Individual members of the committee hammered home the theme that America must wake up to realize that we were in a true space race. Addressing a conference on "Electrical Engineering in Space Technology" in Dallas on April 13, 1960, Subcommittee Chairman Teague noted that "when Russia first put her Sputnik into orbit, we lost an important battle in the eyes of the uncommitted. Also, when Russia—through Lunik 2—implanted the hammer and sickle on the Moon—we lost still another important battle. We cannot afford to lose many more such battles." On March 17, 1960, Representative Daddario bluntly accused NASA of lacking "foresight and urgency" by failing to develop a plan to land a man on the Moon prior to 1970. Referring to rumors that there might be a Russian manned flight to the Moon, Daddario, in an address in Baltimore, claimed that the future of the free world might "depend on whether or not a U.S. mission is already on the Moon when that event occurs."

Glennan maintained his serenity and aplomb in his appearances before the House committee. But a small anecdote reveals the fact

that the committee was getting its point across. Glennan was waiting to testify one morning, following an official committee photograph which had been arranged.

"We want the Doctor up here too. C'mon up and get a picture with the committee," suggested one of the members.

Glennan quipped: "Do you want me up there in my usual position, on my knees?"

The committee persisted in its efforts to get NASA and the administration to raise their sights, and the net effect was to stimulate greater support both in Congress and in the Nation. When some Congressmen felt inclined to cut funds from the program, it was easy to produce a huge majority in favor of the proposition that "rather than being cut, the program should be increased."

EXECUTIVE PRIVILEGE

Early in 1960, the committee had a bruising battle with Glennan over documents needed by the committee to review contract awards to the Rocketdyne Division of North American Aviation, Inc., for development of the $1\frac{1}{2}$ million-pound-thrust engine, and with McDonnell Aircraft Corp. for the development and manufacture of Mercury capsules. In examining NASA's contracting procedures for the \$102 million Rocketdyne contract and the \$28 million McDonnell contract, the committee asked for certain documents and NASA refused to furnish the committee with reports of its Source Selection Board. Prodded by subcommittee Chairman B. F. Sisk (Democrat of California) and Chairman Brooks, NASA repeatedly refused on grounds of "executive privilege." Glennan's position was expressed in this way:

This document contains the personal evaluations and recommendations of certain officials of NASA whom I consulted to aid me in reaching my decision on the selection of a prospective contractor. Since this document discloses the personal judgments of subordinates made in the course of preparing recommendations to me, I am sure you will agree with me that it would not serve the interests of efficient and effective administration of this agency for such a document to be reviewed by anyone outside of NASA.

Both contracts were negotiated contracts, and neither of the final awards were given to the lowest bidders. Private meetings with NASA, Chairman Brooks and the staff failed to provide a solution, so Brooks called an executive session for January 12, 1960, to obtain the advice of the committee. Teague pointed out: "This is not a matter peculiar to this committee, the policy comes right out of the White House. We are wasting time unless you," turning to Brooks "and the chairman of Foreign Affairs and others get together on the fundamental right of Congress to know." Fulton urged: "Do the dramatic thing. Call him

right in here." Sisk added: "We wanted to find out the criteria, the procedure used, because this agency is going to spend billions in the future, and we felt right now was the time to establish once and for all that this committee should have the right." Miller stated: "If we are going to keep scandal away from NASA, and the rest of them spending this money, they certainly can stand the scrutiny of this committee and the scrutiny of the Comptroller General's office, and I for one think they flout the will of Congress."

The Comptroller General, asked by the committee to assist, issued a devastating report following a further denial of the documents to the General Accounting Office. GAO contended that refusal of the documents was "an interference in our statutory responsibilities" and failed to "promote confidence in the conduct of public business."

Sisk concluded that "I feel it is absolutely imperative if we, as Members of Congress, are to fulfill our responsibility to our constituents as taxpayers of this country, that we must have some information on negotiated contracts." Glennan, however, disagreed and added: "I discussed this matter with the President personally and with his staff. The position I take has his approval."

Fulton, as was his frequent custom, shifted his ground once the hearing was under way and defended the practice of executive privilege in the withholding of the documents in question. Most members of the committee became angry, frustrated, and aghast at the belligerent refusal of Glennan to budge as much as a millimeter from his position.

Yet after many hours of emotional confrontation in a morning and afternoon session on January 29, 1960, Chairman Brooks closed the book on the hearings with this conciliatory statement:

I want to assure Dr. Glennan and his staff that this committee is going to continue to work in cooperation with NASA, difficult as it might be under the circumstances, in the interests of speeding up our program in space and in the further interests of our country.

In another age, it seems probable that other congressional committees or members thereof would have exacted some form of retribution in slashed funding, legislative restrictions, or highly critical oversight. But the Committee on Science and Astronautics was firmly dedicated to the proposition that the space program must succeed. There were no recriminations. The committee felt a deep obligation to point out how wrong NASA was, and the committee discovered that the same problems occurred when James E. Webb became NASA Administrator. Yet all memory of the unpleasantly harsh words was quickly washed away overnight as the committee went on to tackle the more important issue of how best to reach the Moon quickly.

TRANSFER OF THE VON BRAUN TEAM TO NASA

Early in 1959, members of the Science and Astronautics Committee visited Cape Canaveral, Fla., witnessed the launches of several missiles, and spent a considerable amount of time at the Army Ballistic Missile Agency in Huntsville, Ala. The boom of a Bomarc missile shattering the predawn darkness at Cape Canaveral took second place to the powerful influence of a personal visit with Dr. Wernher von Braun.

It was easy for the committee members to see and appreciate at Huntsville why von Braun was such a towering figure in the space program. Beyond his stellar technical ability, von Braun demonstrated the inspirational leadership around which thousands of determined scientists and engineers rallied. Not only the repatriated group of newly naturalized associates of von Braun who had been with him at Peenemünde, but countless other experts in the developing new field of rocketry and space found von Braun a leader whom they trusted and admired. To the committee members, von Braun was a symbol of success. His predictions always seemed to come true, he spoke in graphic terms which carried beautifully etched imagery, and he demonstrated to the committee and the world that he practiced what he preached. He was also a popular figure with whom Congressmen and the public quickly identified.

The Science Committee early on recognized and took steps to protect the integrity of one of von Braun's greatest assets—his team. Even before the standing committee was formally organized in 1959, the select committee recognized the team concept which von Braun was stressing. In response to a question from Representative Gerald Ford, von Braun told the committee: "To build up a good team takes years, to wreck it takes a few moments. And yet, these experienced development teams are our greatest single national asset in the race for leadership in missiles and space exploration."

The startling success of von Braun's Explorer I, and his continued success as a supersalesman for space, made the committee even more determined to preserve the "team." NASA made a number of attempts to negotiate the transfer from the Army of those experts who had experience with developing large boosters needed to launch sizable spacecraft.

All three military services stepped up high-powered propaganda campaigns designed to gain public and congressional support for expanding their own programs in space. Secretary of the Army Wilber Brucker threatened to resign if von Braun's group were taken from the Army; the Air Force endured some gentle kidding from the Science Committee by redefining all space as "aerospace;" and the Navy argued before the committee that mobile sea launches like Polaris

were the best path to a workable space program. The Science Committee aired, monitored, and probed into this power struggle.

Throughout the heated fights of 1959, the Science Committee underlined the basic fact, which was also argued strongly by the Eisenhower administration, that NASA must be the dominant agency for the use of space for peaceful purposes. Beyond this, the committee insisted that the von Braun team must remain intact.

The transition was not an easy one. Von Braun's boss was the fearlessly outspoken Maj. Gen. John B. Medaris, commander of the Army Ballistic Missile Agency at Huntsville, Ala., a salesman in his own right. General Medaris so impressed the committee that Chairman Brooks tried to persuade him to join the committee staff as a consultant when Medaris eventually retired in 1960. According to James R. Kilian's account, "Medaris and von Braun campaigned with fierce religious zeal to obtain a central role in space for the Army." At stake was not only von Braun's 4,000-man team at Huntsville, but also the prestigious Jet Propulsion Laboratory at Pasadena, Calif. "JPL" was operated by the California Institute of Technology under Army contract, and its team was headed by Dr. William H. Pickering. NASA desperately needed the in-house capability possessed by both the von Braun and Pickering organizations, and here is the point where the committee played an extremely helpful role.

Because of strong opposition from the Army and some individual Senate and House Members—not primarily on the Science Committee—President Eisenhower initially decided on December 3, 1958, to move only JPL from the Army to NASA, and to allow von Braun's team to work in Huntsville and accept assignments from NASA while technically remaining with the Army. The work already underway at Huntsville on the Saturn program—absolutely essential for the flights to the Moon—prompted NASA to keep pressing for a full transfer of the von Braun team until the Department of Defense and President Eisenhower finally gave their full support in October, 1959. General Medaris and von Braun supported the transfer to NASA when it appeared that a plan was afoot to give the Saturn program to the Air Force, which the Huntsville group feared might reduce its long-range priority.

Although the actual decision to make the transfer was clearly made by President Eisenhower, the Science and Astronautics Committee made two important contributions. First, the committee from the start indicated its confidence in and strong support for von Braun and the team he represented. Second, the committee held hearings on February 3, 1960, to demonstrate its support for House Resolution 567, sponsored by Representative B. F. Sisk of California.



Dr. Wernher von Braun, Director of the Marshall Space Flight Center at Huntsville, Ala., greets members of the Science Committee during one of their many field trips to that installation. From left, Representatives Richard L. Roudebush (Republican of Indiana), R. Walter Riehlman (Republican of New York), James G. Fulton (Republican of Pennsylvania), Col. Earl G. Peacock, committee staff; Col. Harold F. Dyer, committee staff; Representative Olin E. Teague (Democrat of Texas), K. K. Dannenberg of MSFC, Dr. von Braun, Harry H. Gorman of MSFC, Representatives Ken Hechler (Democrat of West Virginia), Joe Waggoner (Democrat of Louisiana), John W. Davis (Democrat of Georgia), and Erich Neubert, MSFC.



Representatives J. Edgar Chenoweth (Republican of Colorado), B. F. Sisk (Democrat of California), Joseph W. Martin, Jr. (Republican of Massachusetts) and Joseph E. Karth (Democrat of Minnesota), far right, with Dr. James A. Van Allen (second from right), after whom the "Van Allen Radiation Belts" were named.

The Sisk resolution called for immediate approval of the transfer, rather than waiting the customary 60 days allowed under statutory reorganization procedures.

During the formal hearing by the committee on the von Braun team transfer, NASA commended the committee for its support of the manner in which the transfer was being arranged. "NASA at this point is confident that the plans are realistic and that, with the support of this committee and the Congress, the proposed transfer can be accomplished in a manner which will greatly strengthen this Nation's space program, both civilian and military," Albert Siepert of NASA told the committee. Siepert added that early passage of the resolution would smooth the transfer and remove employment uncertainties at Huntsville.

In presenting his resolution to the House of Representatives on February 8, 1960, Representative Sisk noted that:

This joint resolution expresses the intent of the Congress that the von Braun team will remain essentially intact, and that our programs for space science and exploration will thereby be materially expedited and advanced.

The major opposition to the resolution came on military grounds and was expressed by Representative Sam Stratton (Democrat of New York) of the House Armed Services Committee. Stratton urged the House to disapprove the resolution because—

I find it difficult to see why the program of an agency that has already demonstrated its ability to get the job done should be switched to an agency which in my judgment has not yet demonstrated its ability successfully to manage a program so vital to our national security.

House Majority Leader John McCormack indicated that "Congress is showing leadership in accelerating the approval of this transfer." Republican support was voiced by Representative R. Walter Riehlman (Republican of New York), who stated:

Dr. von Braun and Secretary Brucker, both of whom appeared before the committee to discuss this matter, left no doubt in the minds of the members that it was entirely satisfactory to them that this transfer be made. They were both in favor of this resolution being passed immediately because of the psychological effect this will have on the von Braun team.

When Representative Stratton demanded a "division" on the adoption of the Sisk resolution, there was an overwhelmingly favorable vote of 92 to 2.

The Senate later held hearings on the joint resolution, but because of a civil rights filibuster, no action was taken prior to the effective date of the transfer on July 1, 1960. Nevertheless, the huge majority by which the House supported the resolution gave the Committee on Science and Astronautics the chance to reaffirm its support of von

Braun's work on the Saturn project. Without that support, confusion and uncertainty would have resulted. The transfer did occur, and the committee helped smooth the way to insure the successful operation of the von Braun team working under new leadership. On July 1, the Marshall Space Flight Center was officially designated by NASA, with von Braun as its first Director.

LIFE SCIENCES

In preparation for eventual Moon flights, as well as the preliminary Mercury and Gemini flights, NASA was prodded by the House Committee on Science and Astronautics to focus on life support systems as well as the more striking priorities such as propulsion. In the early years of the committee, despite the multiplicity of subjects dealt with in hearings and reports, press and popular interest centered on the space race with the Russians and who would get to the Moon first. Members of the committee devoted a great amount of their efforts to educating the public to think more in terms of the need for American preeminence in space, for which the race to the Moon was only one symbol.

During his freshman year in Congress and at the beginning of his service on the committee, a Connecticut lawyer named Emilio Q. "Mim" Daddario gained early renown by developing as a specialist in the life sciences. Some 17 years after leaving NASA, Dr. T. Keith Glennan still vividly recalls Daddario's 1960 questions on life sciences during House hearings. Daddario boned up on everything that was being done by the Army, Navy, Air Force, Federal Aviation Agency, and other Federal agencies on the stress effects of space flight on the human organism. He then performed a very useful function in sending NASA officials scurrying to get themselves briefed on the most up-to-date information available in other agencies on the human factors in space flight.

Every agency and every bureau possesses a prideful desire to save the world in its own way. At a time when there was fierce competition among the military services, and between the military and NASA, for who should control space projects having both civilian and military significance, there was a tendency to build and control duplicating tasks. One of Daddario's early contributions was to point out forcefully the importance of coordination in the life sciences. The results were salutary. Not only did NASA avoid the expense of building competing installations, but also recruited knowledgeable military personnel who had gained their expertise in life sciences - outstanding people like Dr. Charles Berry. Dr. Berry was trained as a flight

surgeon in the Air Force, and later went on to become Chief of Medical Operations at the Manned Spacecraft Center, and the personal physician of the astronauts.

PROJECT MERCURY

The major groundwork for Project Mercury, the first manned space flights, was laid by the Eisenhower administration. To the dismay of the Air Force, and to some extent the Army, Mercury was transferred out of the military and assigned to NASA upon the establishment of that agency in October 1958. President Eisenhower, while insisting that the program be administered under civilian supervision, nevertheless directed that the original Mercury astronauts be drawn from test pilots serving in the Armed Forces.

Even though the committee did not materially shape policy with respect to Project Mercury, the committee members were intensely interested in both the funding and progress of the program and the astronauts themselves. From the day the first seven Mercury astronauts appeared on May 28, 1959, in executive session before the committee, the members developed a close and personalized relationship with the first men in space.

"Do you feel you are being prepared for this flight with as much precaution as the Wright brothers took when they jumped off in their first plane?" asked Representative Gordon McDonough (Republican of California).

John Glenn, in answering affirmatively, also added a rare look into his own future as he replied: "Perhaps the dangers in your profession are more than they are in this."

On numerous occasions prior to the first Mercury suborbital flight of Alan Shepard in 1961, the committee met with the astronauts during their preflight training at Cape Canaveral, Fla. There, the committee had rare opportunities to talk with the astronauts about their training, the safety measures being designed for their protection, the configuration and status of the equipment being developed for their flights, and their own personal suggestions concerning the dramatic experience they faced.

In its first interim report on Project Mercury, the committee on January 27, 1960, underlined the high priority which was placed on the flights. But the committee in its report raised the question of "whether the national interest is best served by a single approach to this problem * * *. If there is an element of criticism in this report, it is not of what is being done or of the people involved, but rather that we are not doing more with other programs dedicated to the broader end of attaining a useful man-in-space capability."

The committee continued in 1960 and 1961 to vote full funding for Project Mercury. While the committee was urging accelerated action on the schedule for Moon flights, NASA personnel were quietly working behind the scenes on the future programs to send instrumented and then manned flights to the Moon. NASA remained confident that they would retain strong support in the Congress for these ventures.

On July 29, 1960, an unmanned Atlas-Mercury booster exploded one minute after launch at Cape Canaveral. But NASA announced the same day that planning had commenced on an entirely new manned space flight program called "Apollo," a project to carry three men in sustained orbital or circumlunar flight. The committee moved fast to support the new program, and also to apply pressure to speed up Mercury.

A NEW ADMINISTRATOR FOR NASA

With the inauguration of President Kennedy, Dr. T. Keith Glennan resigned as NASA Administrator on January 20, 1961. A struggle ensued over whether the new administrator should be a scientific or technical expert, or whether he should be an individual with proven administrative experience. There is no evidence that the House committee influenced the decision, but it is clear that Capitol Hill was the dominant force in directing the final choice. In meetings with President-elect Kennedy and Vice President-elect Johnson in Palm Beach during December 1960, Senator Robert Kerr (Democrat of Oklahoma) was thoroughly briefed on his prospective role as the new chairman of the Senate Aeronautical and Space Sciences Committee which Johnson had chaired. Chairman Brooks joined Kennedy, Johnson, and a special group of scientists headed by Jerome Wiesner, for a January 10, 1961, confab in Johnson's Capitol Hill office to discuss the future of space. Wiesner headed up an "Ad Hoc Committee on Space" for the President-elect, and later was named as President Kennedy's special assistant for science and technology. Wiesner and Johnson clashed on several issues, including what kind of person should be Administrator of NASA; Johnson wanted a man with political savvy and administrative ability, and Wiesner leaned toward an individual who had more scientific and engineering background.

In addition, Wiesner's committee issued a report labeling Project Mercury as "marginal", expressed the fear that an astronaut might be killed or not recovered from orbit, and urged a deemphasis of manned space flight.

Johnson, winning the power struggle with Wiesner, proceeded to interview a large number of possible appointees. In his book, *The Vantage Point*, Johnson relates that President Kennedy wanted to offer the

job to retired Gen. James M. Gavin, who had headed Army research and development. Johnson persuaded the President that it would be a serious mistake to put a military man at the head of NASA in light of the strong feeling expressed by Congress in the Space Act, committing the United States to develop the use of space for peaceful goals.

Senator Kerr was a key factor in the eventual selection of James E. Webb. After a long delay during which Kerr attempted to obtain for Webb appointment as Secretary of the Treasury, the pieces began to fall into place. Johnson felt strongly that the appointment should not be determined by scientific knowledge as much as administrative ability, and he also resisted the pressure of the powerful groups lobbying to turn the space program over to the Air Force. Kerr knew Webb intimately, not only as a fellow Oklahoman but as a director and officer of Kerr-McGee Oil Industries, Inc. Far more important, everyone concerned appreciated that Webb had precisely the qualities necessary to lead, inspire and manage a massively expanding organization like NASA.

From a congressional standpoint, Webb was a perfect choice. He had actually served on the Hill as Administrative Assistant to the Chairman of the House Committee on Rules, Representative Edward Pou (Democrat of North Carolina), in the early Roosevelt years. As Director of the Bureau of the Budget and Under Secretary of State, he had cultivated excellent congressional relations both institutionally and personally. A lawyer, Marine aviator in World War II, associated with several nonprofit educational foundations, Webb had the breadth of experience to handle problems and issues across the board. He also had many scientific ties and a good personal friendship with Wiesner, even though the latter did not at the time consider Webb to be his first choice.

"Senator Kerr originally called me in Oklahoma City toward the latter part of January, and said that Mr. Johnson would be calling me, or the White House would be calling me to ask me to come to Washington to talk about the job. He hoped very much that I would take it, and he knew then that he was going to be chairman of the Senate Committee on Aeronautical and Space Sciences," Webb recalls. As it turns out, Webb was called from the dais to take a Washington call from Wiesner, while attending a luncheon in Oklahoma City honoring Senator Kerr. At President Kennedy's direction, Wiesner phoned Webb and asked him to come to Washington on January 30 to discuss the job.

Webb, after lunching with NASA Deputy Administrator Dr. Hugh Dryden, called at the White House. President Kennedy told Webb he wanted as NASA Administrator not a scientist but, "someone who

understands policy. This program involves great issues of national and international policy." In accepting the appointment, Webb asked that Dr. Dryden be renominated as Deputy Administrator. He also announced his intention to retain Dr. Robert C. Seamans, Jr., as Associate Administrator; Seamans had come aboard at NASA in September 1960. Webb was sworn in as NASA Administrator on February 14, 1961.

Webb made an immediate hit with the Committee on Science and Astronautics. His enthusiasm for the space program was contagious. His outgoing personality and unbounded optimism were in marked contrast to his more reserved predecessor, Dr. Glennan.

Webb's assets included an ability to win the confidence of Republicans. On February 27, 1961, he honored the House Science Committee with his maiden appearance and this introduction:

This is not only my first appearance before this committee, but the first appearance in public of any kind or description since I took the oath of office.

On the occasion, former Speaker Martin welcomed Mr. Webb with these words:

I first want to congratulate the country in getting Mr. Webb as the head of NASA. It has been my privilege to know Mr. Webb almost longer than memory would permit accurate recollection. When Ed Pou was chairman of the old Rules Committee of the House, Mr. Webb did wonderful service with him. I have come to know him through the years in all aspects of his career. NASA is to be congratulated upon getting a dedicated public servant such as Mr. Webb.

The members of the House committee admired Webb's effectiveness as a salesman. Some members probably disliked his tendency to give longwinded answers to pointed questions, but this was a trait which was also very familiar among congressional colleagues, hence accepted in a bemused fashion.

Perhaps Webb's strongest asset in his relations with the Science Committee was his accessibility and close working relationship with the successive chairmen of the committee. Brooks lived for less than a year after Webb assumed office, and their relationship was never close. But both Miller and Teague quickly developed a personal rapport with Webb which enabled frequent, frank, behind-the-scenes conversations to anticipate problems in advance, and to tackle issues which otherwise might have ballooned into controversies.

The issue of whether to go to the Moon and how soon was resolved in a somewhat different fashion, and with somewhat less input from the Science Committee than in other cases where the committee influenced NASA policy. This was partially due to the fact that Webb was feeling his way as a new Administrator in 1961 and was treating the committee in the more traditional, formal fashion used by those

downtown who respect the separation of powers. In addition, Brooks was exerting leadership to fashion the committee into an independent force, rather than an appendage of the agencies over which it was exercising oversight. Nevertheless, the committee continued to press for an early decision to commit the Nation to a manned series of flights to the Moon. In the early months of the Kennedy administration, the committee demonstrated that it was far more hawkish on manned space flight than even Mr. Webb would publicly admit at that time.

THE AIR FORCE CHALLENGE TO NASA

The Committee on Science and Astronautics and its predecessor, the select committee, had entrenched NASA as the custodian of the Nation's space program and endowed it with a distinctly civilian flavor. The Army, Navy and Air Force, each of which had a clear military interest in the development of space weaponry, struggled insistently to wrest more of the space budget away from NASA. The Science Committee listened intently to a parade of military witnesses advocating more power for the military in space in order to protect America's national security. With the exception of a minority of the committee on both sides of the political aisle, generally the committee wound up on the side of NASA and the peaceful uses of space.

The Air Force launched the most vigorous campaign to support its own role in space, and for several reasons that campaign reached a fever pitch late in 1960 and in the early months of 1961. The 1960 Presidential campaign had debated the so-called "missile gap," and many of John F. Kennedy's statements stressed the national security aspects of space. When President Kennedy first assumed office and before NASA Administrator Webb began to assert himself, there was a vacuum in leadership on space matters which was not filled until some clear budgetary decisions were made later in the spring of 1961. Finally, the Wiesner report contained some criticisms of NASA which the Air Force picked up to strengthen its case. The House Committee on Science and Astronautics printed a very revealing December 1, 1960, memorandum from the Office of the Secretary of the Air Force to all Air Force commanders and contractors urging a larger role in space for the Air Force and its contractors.

When the Wiesner report was unveiled in Chairman Brooks' presence on January 10, 1961, he became disturbed by some of its implications in threatening the role of NASA in space. In February, the Science Committee held its annual round of hearings on defense interests in space, and heard from the Department of Defense as well as the Army, Navy and Air Force. Following these hearings, Chairman Brooks was impelled to write to President Kennedy on March 9, 1961:

I am seriously disturbed by the persistency and strength of implications reaching me to the effect that a radical change in our national space policy is contemplated within some areas of the executive branch. In essence, it is implied that United States policy should be revised to accentuate the military uses of space at the expense of civilian and peaceful uses.

Of course, I am aware that no official statement to this effect has been forthcoming; but the voluminous rash of such reports appearing in the press, and particularly in the military and trade journals, is, it seems to me, indicative that more than mere rumor is involved.

Moreover, I cannot fail to take cognizance of the fact that emphasis on the military uses of space is being promoted in a quasi-public fashion within the defense establishment. Nor can I ignore the suggestion, implicit in the unabridged version of the Wiesner report, that the National Aeronautics and Space Administration role in space is purely one of scientific research and that the military role in the development of space systems will be predominant. Such an assertion not only seems to disregard the spirit of the law but minimizes the values of peaceful space exploration and exploitation.

Brooks stressed in his letter how important it was to support the civilian space program as a means of "preserving the peaceful image of the United States." He wrote the President that he did not want to see "the military tail undertake to wag the space dog" and that "if NASA's role is in any way diminished in favor of a space research program conducted by a single military service, it seems unlikely to me that we shall ever overtake our Soviet competition which, by the way, has been peculiarly effective because of its public emphasis on scientific and peaceful uses of space."

The letter from the chairman of the House Committee on Science and Astronautics to President Kennedy had a very healthy effect in strengthening the determination of the President to protect NASA's turf. The President responded to Chairman Brooks on March 23, 1961:

It is not now, nor has it ever been my intention to subordinate the activities in space of the National Aeronautics and Space Administration to those of the Department of Defense. * * * Furthermore, I have been assured by Dr. Wiesner that it was not the intention of his space task force to recommend the restriction of NASA to the area of scientific research in space.

Even though the letter left unanswered issues like the possible future interest of the Air Force in developing large space boosters, or manned flights moonward, the interchange cleared the air and helped strengthen NASA's position against the forces eager to get a bigger cut of the space budget pie.

MANNED FLIGHT AND THE KENNEDY BUDGET

As the House committee started its 1961 hearings, one by one every NASA official informed the committee that they favored speeding up the timetable for a manned flight to the Moon. Webb informed

the House committee that his first task was to make a thorough review of the Eisenhower space budget, and the implication was clear that the conclusions would justify stepping up the total effort. Dr. Dryden, who had shocked the select committee in 1958 by downgrading manned flight by comparing it with the circus stunt of shooting a woman out of a cannon, exuded a new spirit of buoyant optimism on March 14 as he exulted about the successful suborbital flight of the chimpanzee Ham in a capsule atop a Redstone missile. Dr. Dryden added:

You will recall that in the budget submitted by Mr. Eisenhower there was a statement that he could see no reason for proceeding beyond Project Mercury. This I think you know is not in accordance with my own recommendations and ideas.

At the same March 14 House committee hearing, Dr. Seamans made his own position crystal clear: "As an individual, I'm irrevocably committed to pushing the man-in-space program at a maximum speed consistent with budgetary matters and things of that sort." Seamans could sense that "budgetary matters and things of that sort" would soon give a big push to plans which were already being formulated for a speeded-up Moon flight. Dr. Robert Gilruth's Space Task Group, working out of Langley, and George M. Low, at NASA's headquarters, had underway detailed studies which were far more optimistic than NASA's old 10-year plan which pegged the manned Moon landing as sometime after 1970.

On April 10, Webb made another appearance before the House Science Committee, telling the House Members that the President was asking \$125.6 million more for NASA—most of the stepped-up funds to go toward development of the Saturn booster.

Webb was followed on April 11 by George Low, who brought the committee up to date on Project Mercury. Low clashed with Miller on the issue of whether the January 31, 1961, flight of the chimpanzee "Ham" had been a success, as listed by Low on a huge chart he showed the committee. Miller challenged Low in sharp terms:

Mr. MILLER. In the case of "Ham," that was the January 31 flight that you showed as successful there?

Mr. Low. Yes, sir.

Mr. MILLER. Wasn't there a condition there where you had planned on one orbit and something went wrong and you kicked him out 120 miles further?

Mr. Low. We went about 120 miles farther than planned.

Mr. MILLER. Shouldn't this be put down as a failure for the booster?

Mr. Low. Perhaps I should add another column to this chart for the booster, to indicate its performance.

Mr. MILLER. I think you should. I think you are trying to fool us.

Mr. Low. I am not —

Mr. MILLER. I suggest you correct the chart before it goes into the record.

[The chart printed in the hearing record still listed the flight as a success, with the notation: "Booster difficulties resulted in longer range than planned."]

As the noon hour approached, Low announced that he had a movie of the Ham flight, just produced the day before, which he wanted to show the committee. Chairman Brooks responded: "We better recess at this point, so you will have a prelude to your movie when you present it to the committee."

Low had scarcely finished his testimony on April 11 when an event as shocking as Sputnik occurred, which spurred a radical change in attitudes and timetables from the top to the bottom of the space program.

EFFECT OF GAGARIN FLIGHT

On March 9 and 25, the Russians had successfully orbited and recovered dogs in their spaceships. Suddenly on April 12 came the electrifying news that Maj. Yuri Alekseyevich Gagarin in a 5-ton Vostok spacecraft had orbited the Earth in 89 minutes, returning safely to Earth without any problems caused by weightlessness or reentry.

In the early morning hours, many telephones rang to alert committee members and NASA officials with the skimpy details of the Gagarin flight. Newsmen awakened John A. "Shorty" Powers, "the Voice of Mercury Control" and public affairs officer for the Mercury program at Cape Canaveral, to ask for a public statement. Powers responded candidly: "We're all asleep down here."

The House committee had scheduled Dr. Edward C. Welsh, Executive Secretary of the National Aeronautics and Space Council, for April 12. Welsh appeared on behalf of legislation to make the Vice President Chairman of the Space Council. He was battered with questions about the Gagarin flight. Initially, he told Chairman Brooks:

You said before this hearing that you were woke up about 3 o'clock this morning to receive some information, and so was I. So each of us missed that much sleep.

Welsh realized what every NASA official soon discovered also, that the Science Committee was expressing the insistent, demanding, sentiment of most Americans that it's about time we start doing something to demonstrate our capabilities in space. The blows to national pride caused angry reactions. There had been a brief honeymoon after President Kennedy took office, but it was obviously now over. NASA officials, in turn, were expected to demonstrate that they shared the sense of urgency being strongly expressed through the committee.

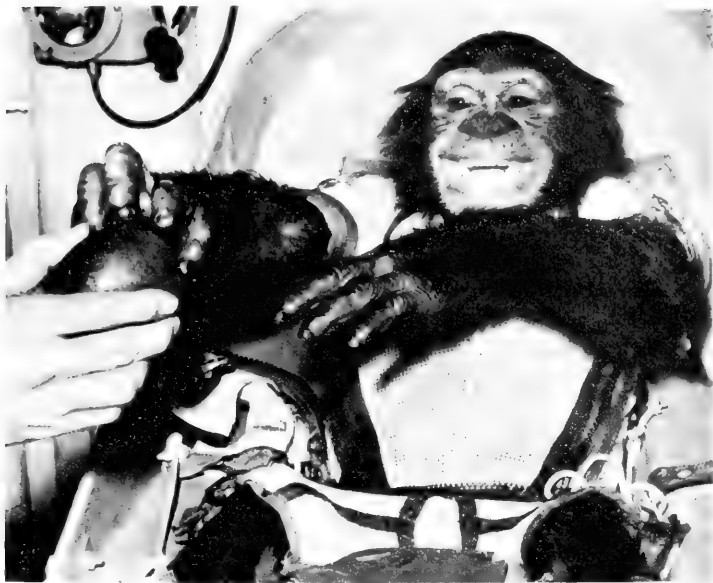
Representative James G. Fulton (Republican of Pennsylvania), who had become the laughing stock of many Members by his repeated announcements he wanted to make a flight himself, startled Welsh by suggesting:

I think we are getting to the point where if they are afraid, let more of us go who aren't afraid of the risk. If it is good enough for Ham, and a chimpanzee can do it, why couldn't a man do it?

I am always laughed at, but I would go in a minute.

Suave, poised, and experienced in appearances before congressional committees, Welsh was stunned into speechlessness. Chairman Brooks broke the tension by observing dryly:

We will get you a one-way ticket there sometime.



A delighted chimpanzee "Ham" reaches out from his couch to take an apple from a crewman of the U.S.S. *Domer*. This was the first food for "Ham" after a 420-mile ride in a Mercury capsule prior to the first manned flight in space.

Fulton added:

The thing to do is to get some space enthusiasts, as they had when they were developing airplanes, who are willing to take certain risks. I am getting awfully tired of the Mother Hubbard approach of "Tie your apron up after the Russians do it." All you have to do is put a little overtime on and go around the clock on some of these programs instead of knocking off at 5 o'clock. I think we in the United States should stand the expense of it and put some overtime in on this and pay for it.

Chairman Brooks, King, Karth, Anfuso, and other committee members also suggested that the United States should be making an all-out drive to overtake the Soviet Union. Miller entered a cautionary note, stating:

I think we are justified in proceeding with celerity but not trying to get into competition on this thing. * * * We are more than justified in taking our time and doing a thorough job rather than just trying to be in competition.

Fulton was insistent, and he told the committee:

Spend the money that is necessary and let's be preeminent in science. I think you can win with all the international conferences in the world and you lose one on man-in-space such as we did yesterday; you are rated a second-rate power whether you like it or not.

With one eye on the press table, Fulton also added a one-liner which eventually reverberated all the way up Pennsylvania Avenue to the White House: "I am tired of coming in second best all the time," he told Welsh.

REACTION OF PRESIDENT KENNEDY

A few hours later when President Kennedy held his news conference, a reporter asked:

Mr. President, a Member of Congress said today that he was tired of seeing the United States second to Russia in the space field. I suppose he speaks for a lot of others. Now, you have asked Congress for more money to speed up our space program. What is the prospect that we will catch up with Russia and perhaps surpass Russia in this field?

The President answered at some length, and among his remarks were the following:

Well, the Soviet Union gained an important advantage by securing these large boosters which were able to put up greater weights, and that advantage is going to be with them for some time. However tired anybody may be, and no one is more tired than I am, it is a fact that it is going to take some time and I think we have to recognize it * * *.

So that in answer to your question, as I said in my State of the Union message, the news will be worse before it is better, and it will be some time before we catch up. We are, I hope, going to go in other areas where we can be first and which will bring perhaps more long-range benefits to mankind. But here we are behind.

The April 12 hearing with Welsh spent precious little time on the more mundane issues of how to hurry along the legislation to make the Vice President head of the Space Council. Typical of the observations was the reaction of Representative Victor L. Anfuso (Democrat of New York), fourth-ranked member of the committee and a sub-committee chairman:

We can't just wait on this 10-year period program because if we carry out the things that they say in 10 years the Lord knows where the Russians will be by then and whether America will still be in existence.

Finally, Anfuso added: "I think we have debated this bill long enough. We have had an interesting session here. I move that we report out H.R. 6169." The committee quickly went into executive session, reported out the bill, 20 to 0 and got ready to send it to the House floor. The bill cleared the House and Senate with remarkable

speed, and was signed by the President on April 25. Once the committee had completed its executive session, the members got ready to sharpen their knives for the top officials of NASA who appeared on April 13.

From the perspective of many years later, NASA Associate Administrator Seamans described the atmosphere after the Gagarin flight:

The day after Gagarin went into orbit was one of the more hectic days in NASA's existence * * *. Jim Webb and Hugh Dryden testified and people were pounding the desks, and why aren't we going faster, and why aren't we working triple time, and we can't let the Russians do this and keep doing this to us.

THE COMMITTEE SEIZES THE INITIATIVE

At the pressrooms and radio and television gallery of the Capitol, demands from news editors were pouring in to obtain congressional reactions to the Gagarin flight. Recognizing the tremendous popular interest in the issue, Chairman Brooks convened the April 13 hearing with Webb and Dryden in the huge Cannon caucus room. In opening the hearing, Brooks observed that "Because of the events of the last few days, we expect a large audience, and we thought it would be more comfortable for some of our friends, especially the press, radio, and television people, to meet here."

Webb related in a memo to President Kennedy's assistant, Kenneth O'Donnell, what happened on April 13 "in the atmosphere of great excitement and focusing of public interest in the hearings held in the caucus room." Webb added:

The members of the committee, almost without exception, were in a mood to try to find someone responsible for losing the race to the Russians and also to let it be known publicly that they were not responsible and that they were demanding urgent action so that we would not be behind. Pursuing this further in the days that followed, the committee steadily bored in on every phase, trying to get every bit of detailed information that would focus public interest on the committee, and the role it had chosen for itself as the goad to force a large increase in the program.

It was one of the few occasions in Webb's experience when the enthusiasm of the committee far exceeded his own. "The committee is clearly in a runaway mood," Webb warned, adding that "I believe I can assure you that NASA personnel have not so conducted themselves as to cause the type of hearing now being conducted." Webb was cast in the unusual role of the calm, cool, and collected defender of a program who refused to be affected by the supercharged effort of the enthusiasts to get him to speedup his program. The former Director of the Budget reported:

On every point in the budget which the committee has covered, they have specifically pressed to ask what our presentation to the Bureau of the Budget included

and have asked the question as to why it was denied * * *. I based my position on the fact that the U.S. effort was "a solidly based, step-by-step program, based on a long period of effort * * *."

One after another, members of the committee communicated their intense, sometimes emotional, concern over whether NASA was moving fast enough. Representative Joseph E. Karth (Democrat of Minnesota) stressed the need to forget the 40-hour week, and pay overtime where the critical bottlenecks were occurring. Representative Jessica McC. Weis (Republican of New York) remarked to Mr. Webb: "It must be very refreshing to be before a committee that is anxious to give you more money than you seem to want," to which Mr. Webb quite diplomatically responded: We "certainly appreciate this committee." The exchanges were tense, the atmosphere highly charged, and once again the committee successfully transmitted the overpowering sentiment of the people that they wished President Kennedy would fulfill his campaign promise in space to "get the country moving again."

In the small, cramped room 214-B of the Longworth Building, Dr. Seamans and George Low returned to testify on April 14. Low had planned to show the film of the flight of the chimpanzee Ham, originally scheduled for his presentation on April 11. He later confessed:

We thought it would not be in our best interest to show how we had flown a monkey on a suborbital flight when the Soviets had orbited Gagarin. The chairman did say, "Well, we thought we were going to start with the movie." We looked around and the projectionist wasn't there, and we fumbled and said, "We don't have it with us today."

Dr. Seamans' testimony demonstrates how a congressional committee can frequently affect both the timing and substance of a Presidential decision, even though the decision itself is made in the White House and is exclusively a Presidential responsibility.

Under questioning by Karth, Dr. Seamans indicated that additional funds for Saturn enabled NASA to step up the schedule for a manned landing on the Moon. He stated that as a result of the NASA review of the Eisenhower budget, \$308 million had been requested above that budget, and the President had approved an increase of \$125.6 million of that amount. Asked for his personal opinion as to what NASA could do with additional money for the Apollo program, Seamans responded: "My own opinion is that the country is capable of more effort in this area than it is now expending."

SPEEDING UP THE LUNAR LANDING TIMETABLE

Among the welter of questions which bombarded Dr. Seamans on April 14, the one most vividly etched in his memory was posed by

freshman Democrat David S. King. Son of a U.S. Senator, representing a very shaky district in Salt Lake City, Utah, King was one of the prime critics on the committee who was advocating use of solids instead of liquids in space boosters. On this particular day, he recited the biblical parable of the king who found himself in the unenviable position of confronting 50,000 enemy troops while he possessed only 10,000. He noted: "The point of the parable being that before engaging in contest one must very carefully evaluate and appraise the strength of the adversary." When Dr. Seamans could not answer pointedly the obvious question whether the United States would get to the Moon before the Russians, King then posed this question:

The Russians have indicated at various times that their goal is to get a man on the Moon and return safely by 1967, the 50th anniversary of the Bolshevik Revolution. Now specifically I would like to know, yes or no, are we making that a specific target date to try to equal or surpass their achievement?

Seamans answered:

As I indicated in earlier testimony this morning, our dates are for a circumlunar flight in 1967, and a target date for the manned lunar landing in 1969 or 1970.

King then asked whether, through a fuller marshaling of manpower and resources it might be possible to meet a target date of 1967. Dr. Seamans responded that "to compress the program by 3 years means that greatly increased funding would be required for the interval of time between now and 1967. I cannot state that this is an impossible objective * * * my estimate at this moment is that the goal may very well be achievable."

Pressed by Representative J. Edgar Chenoweth (Republican of Colorado), Seamans indicated that to speed up the lunar landing goal would cost many billions of dollars. Chenoweth raised the question of "whether our economy can stand perhaps double or treble the present funding or even go higher than that, by putting up money to achieve this lunar shot, say in 1967, or even before. It is a question of whether such an accomplishment has that much national and international significance and importance. Do you agree with that?"

Dr. SEAMANS. Yes—

Mr. CHENOWETH. You say the United States can do it if we increase the money?

Dr. SEAMANS. I did not say we could do it. I said we would review our plans and advise whether it was possible. I think it may be possible.

Chenoweth became even more disturbed as Seamans remained optimistic. With rare vision, he virtually predicted what would happen as a result of the discussion:

Mr. CHENOWETH. I think you have to be very careful of what you tell this committee because there will be those who will say, "All right, let's boost up our appropriation, double it, treble it. The most important thing is to put this man on the Moon."

I don't know that it is. I doubt it. But some feel that way. I think it is a high policy decision to be made and to be made shortly. I think it is important you word your answers carefully here, because the wrong interpretations may be placed upon them not only by this committee but by those who will read the news stories that will go out.

Dr. SEAMANS [continuing]. I feel this committee is a most important forum for discussion of this issue. I believe there are other important forums. I agree this is a most important national issue.

Mr. CHENOWETH. The question is whether it is of such great importance that we can afford to neglect other programs that perhaps may involve a change of our whole fiscal program in order to accomplish this one objective. Is it that important, in your opinion?

Dr. SEAMANS. Obviously I cannot answer that question.

Mr. CHENOWETH. It is a decision to be made at a higher level.

Dr. SEAMANS. I think it is a decision to be made by the people of the United States.

Mr. CHENOWETH. How will they make it?

Dr. SEAMANS. Through the Congress and through the President. It is a matter of national importance to have specific objectives for our space effort.

Mr. CHENOWETH. I disagree. The people of this country do not have the technical knowledge on this subject that you have. When you talk about placing a man on the Moon, they don't know what you are talking about. They don't know what expenditure is involved, nor the scientific and research work that has to be done. We can't expect them to make that decision.

Mr. MILLER. Is this not our responsibility as the representatives of the people?

Mr. CHENOWETH. We can make the decision. But I think when it comes to affecting the economy and the fiscal policies of this country and the tremendous amounts of money that are involved, I think perhaps this will have to be made at a higher level of the administration.

A battery of television cameras, tape recorders, microphones, and pushing reporters with notebooks greeted Dr. Seamans when he emerged from the hearing room shortly before noon. As the committee remained behind for an hour-long executive session, beads of sweat slowly gathered on Seamans' forehead from the hot glare of the lights in the narrow corridor of the Longworth Building. There was cold sweat when he picked up *The New York Times* and the *Washington Post* the following morning. And in the Oval Office at the other end of Pennsylvania Avenue, there was an explosive reaction from President Kennedy.

The *Washington Post* headlined the testimony: "Reaching Moon First Would Cost Billions, Expert Tells House Unit." The lead began: "A multibillion-dollar crash space program might put an American on the Moon by 1967—perhaps ahead of the Russians—a top Government official said yesterday." The *New York Times* correctly interpreted Seamans' testimony in the following terms: "Pointing to the large expense involved in a 'crash' effort to land a man on the Moon, Mr. Seamans repeatedly emphasized that such a venture presented 'a most

important national issue,' and that the American people, Congress, and the President would have to decide whether it was in the national interest * * * Mr. Seamans confirmed reports that the administration had refused funds requested by his agency for development and fabrication of the Apollo capsule. The space agency, he said, asked for an overall budget of \$1.4 billion but had its request cut by \$182 million by the administration."

Seamans relates that the President was very upset "that some minion of his that he didn't know was talking about going to the Moon, and I thought it might be the end of my existence at NASA." As a matter of fact, Seamans' job was in real jeopardy as a result of the incident. But the Gagarin flight, the testimony before the House Science Committee and the issue of what must be done to restore America's badly bruised prestige spurred the President to focus on the space program and lunar landing in the next few weeks.

With this backdrop, President Kennedy called Vice President Johnson to his office April 19. The next day, the same day Congress approved the legislation to make Johnson Chairman of the Space Council, the President wrote a memorandum to his Vice President commencing: "In accordance with our conversation, I would like for you as Chairman of the Space Council to be in charge of making an overall survey of where we stand in space." By April 19, the abortive Bay of Pigs invasion had degenerated into a total failure, and historians will argue how much this defeat may have related to the lunar landing decision. On April 21, the President in a press conference stated bluntly: "If we can get to the Moon before the Russians, then we should."

While Johnson was holding almost nonstop conferences to assemble the best advice from sources both within and outside the Government, the House Science Committee continued to hold daily hearings on the NASA budget. In addition to fine-tooth combing that budget, the House committee continued to press very hard for a general speedup in the entire space program. This pressure certainly was not lost on NASA officials making their frequent appearances by day and relaying their assessments by night. By April 28, Johnson had a preliminary memorandum ready for the President, recommending a manned lunar landing as the centerpiece of the space program.

Early in May, activity intensified on both ends of Pennsylvania Avenue. Johnson telephoned many Congressmen to learn whether they would support a greatly accelerated step-up in the space program; he was encouraged to receive enthusiastic bipartisan support. In response to Johnson's request, Chairman Brooks submitted a 10-page memorandum entitled "Recommendations re the National Space Program,"

dated May 4, starting: "We cannot concede the Moon to the Soviets, for it is conceivable that the nation which controls the Moon may well control the Earth." Brooks noted that he and his committee believed that "the United States must do whatever is necessary to gain unequivocal leadership in space exploration." The committee recommended an immediate acceleration of programs for communications, television, weather, and navigation satellites. Also suggested was an orbiting astronomical observatory aimed at discovering "the origin, evolution, and nature of the universe." The memorandum also argued the economics of a larger space program, pointing out that the Soviets were devoting 2 percent of their gross national product to space, and "a \$5 billion a year space program represents only about 1 percent of our gross national product, even half of which offers returns crucial to the leadership, the prestige, and perhaps even the survival of the United States."

In a series of executive sessions between May 1 and May 4, the committee broke open the budget. The committee voted to restore every penny of the nearly \$200 million cut from NASA's requests by the President's Bureau of the Budget. In addition to a \$15 million add-on authorization for solid fuel propulsion, the committee voted to fund \$50.2 million above the Budget-approved figure for Project Apollo. The committee voted every penny that NASA had requested, and had been cut by the Budget Bureau, and added \$7.6 million for additional Apollo tracking facilities and staffing the Apollo program.

By these actions, the Science Committee sent a clear message to the President that he could and should raise his own sights on the future of the space program.

At a final executive session on May 4, 1961, the committee in morning and afternoon sessions worked feverishly to hammer home the final details of the authorization bill. Knowledge of the Johnson study was piecemealed to the committee, and had its effect in the bullish attitude of the committee, as the following typical colloquy indicates:

Mr. MOSHER. Do you have information that the administration will come in with recommendations that will completely differ from what we are accomplishing?

Chairman BROOKS. All I know is a study is being made of this at this time. The public is pretty well shaken up that the Russians did orbit the Earth with a man and we haven't—

Mr. MOSHER. I would assume that this shakeup in public opinion would be reflected in the administration's recommendations—

Chairman BROOKS [continuing]. What we know is that they are making a study. I think their study is very appropriate in the light of the fact that we have just put through a measure implementing the Space Council and the Space Council is at work.

Mr. MOELLER. Would it not seem that the public would then expect and Congress here in particular would expect that if this shakeup is having any kind of effect at all, it ought to be reflected by the activities of this committee, to push this thing even a little harder and with more money?

Chairman BROOKS. The committee certainly got very favorable comment from its recent actions in apparently pushing the program.

Mr. MOELLER. I don't think we should wait for the President's recommendations.

Chairman BROOKS. We are not—

All along the line, the committee took an aggressive position in support of almost every aspect of NASA's program. This was especially true on Apollo-related activities. With the leadership of Teague and Daddario, the Teague subcommittee held intensive hearings on the life sciences program. As Teague reported to the full committee: "I think the fact that Mr. Daddario brought this up caused them to search their minds for a more aggressive program than they had in mind."

SHEPARD'S SUBORBITAL FLIGHT

It was almost 5 p.m. when the committee finished its markup session on May 4. Members barely had time to grab their overnight bags, rush to Andrews Air Force Base, and enplane for the flight to Patrick Air Force Base, Fla. There they motored to Cocoa Beach to prepare for an early-morning bus ride to Cape Canaveral, where thousands of spectators awaited the first attempt to put a man in space. Alan Shepard's 15-minute suborbital flight seems rather puny today, but to the committee all of the prestige of the Nation and the future of the space program rested on the absolute necessity for its success.

Meanwhile, back in Washington, Vice President Johnson learned that he would be departing May 8 for a 2-week tour of Southeast Asia. So he ordered NASA and the Department of Defense to have their reports on the future of space in his hands before his departure, necessitating round-the-clock work over the weekend even by those officials who made the trip to witness the Shepard flight.

The members of the committee knew Shepard and the other six Mercury astronauts, had followed their training, voted funds for their support, and had a personal as well as official stake in the success of the flight. The committee strongly opposed the views expressed by Senators John Williams (Republican of Delaware) and J. William Fulbright (Democrat of Arkansas), who had urged President Kennedy either to postpone the flight or close it to the press. The committee supported the view that the open media coverage of every detail of the Shepard and subsequent flights was a real plus in contrast to the Soviet

practice of hiding failures and never announcing a space success until after it had been achieved.

At 1:30 a.m., May 5, Alan Shepard was awakened and started the long series of preparations necessary prior to his historic flight after daybreak. By that time, most of the committee members had bedded down, awaiting the predawn phone call alerting them for their bus trip out to the Cape. Not all members of the committee could sleep, however.

At 2:30 a.m., the telephone jangle awoke one of the members of the committee. He was deeply chagrined and embarrassed when the voice on the phone gruffly proclaimed:

This is Tiger Teague. The whole crew is getting on the bus, and we've been waiting for you for 10 minutes. Get your tail down to the lobby right away or you'll be left behind!

Three minutes later, an unshaven, dishevelled Congressman breathlessly asked a sleepy-eyed desk clerk: "Where is everybody?"—only to learn that the wake-up calls would not be made until 5 a.m.

Out at the Cape, the committee members watched closely as final checks were made at Mercury Control. NASA Administrator Webb was visibly nervous. Teague recalls Webb had three statements ready; one if the flight succeeded, one if Shepard had to be ejected in case of malfunction, and a third in case the astronaut was killed. One of the members, standing next to Bill Hines of the Washington Evening Star, heard him report over a live telephone line to his paper:

Two, one, zero, ignition!

There it goes!!

This is the moment, the first time an American has entrusted his life to one of these things. I am covering this story, but God help this man.

Shepard's flight, viewed by millions live on television, was an unqualified success. His wife, Louise, remarked: "This is just a baby step, I guess, for what we will see."

Back in Washington, many officials were frantically putting together the final report which Vice President Johnson had ordered three days after the successful Shepard flight. It was their responsibility to project that baby step into a giant stride.

After Shepard addressed a joint meeting of Congress on May 8, Johnson was handed the final memorandum which he took to President Kennedy without change. The memorandum began: "It is man, not merely machines, in space that captures the imagination of the world." In the ensuing time frame, President Kennedy polished the historic declaration which he was to make to the Congress on May 25.

The day before President Kennedy appeared before the joint session of Congress to announce the goal of a lunar landing, the Science and

Astronautics Committee brought its authorization bill to the floor. The timing was perfect. Six weeks after the shocker delivered by Gagarin's orbital flight, and less than three weeks after America swelled with pride at Shepard's achievement, the committee presented to Congress a bill with a price tag of \$1.37 billion—some \$142 million beyond what had been budgeted in the March revision made by the Kennedy administration. Chairman Brooks was not breaking anything "top secret" when he told the House that "Tomorrow there will be recommendations by the President * * * for a considerably larger sum." Majority Leader John McCormack, in supporting the huge bill, also mentioned the President's impending appearance on behalf of increased funding and added:

That clearly shows the judgment of the chairman and the members of the committee is sound and that they were looking to the future * * *. Read the reports of this committee. They are ahead of the Executive * * *. This committee stands not for catching up—but for surpassing.

Former Speaker Martin in supporting the 40-percent increase in funding over what had been voted in 1960, also underlined the bipartisan character of the Science Committee's operations:

I have been here for 37 years, and I have never seen more dedicated service than the members have devoted to this subject. Let me say, too, that the subject is one that is very difficult and very technical. It requires great study. That it has had. Above all, what impressed me was the fact that there was no partisanship displayed in this committee in any instance. We all had, on both sides, but one purpose, and that was to do what was best for America and for the development of science.

When President Kennedy appeared to announce his recommendation that a manned lunar landing within the decade be set as a national goal, he told the Congress that "no single space project in this period will be more impressive to mankind, or more important for the long-range exploration of space; and none will be so difficult or expensive to accomplish."

In asking the Congress for over half a billion dollars in additional funds for NASA and the Department of Defense, President Kennedy also helped to pinpoint the responsibility, not only of the Nation, but the immediate tasks facing the committees in the Congress:

Now this is a choice which this country must make, and I am confident that under the leadership of the Space Committees of the Congress, and the Appropriations Committee, that you will consider the matter carefully.

The House Committee on Science and Astronautics went to work again after President Kennedy's address. In subsequent discussions, both the committee and the House considered and in effect ratified the new goal of a manned lunar flight within the decade. Although both the committee and the House had force-fed NASA with \$142

million more than President Kennedy's figure unveiled in March, the President leapfrogged Congress with a startling new request for some half a billion dollars beyond the House-passed figure at the time he made his dramatic May 25 announcement.

The Senate docilely voted every penny of the President's request on June 28. The House held 3 days of hearings starting July 11. Members wanted to know why NASA in March had sworn that extra money would be uneconomic, wasteful, and not speed up the program, and now they were coming in to do a 180-degree turn. Dr. Dryden explained it as a policy decision: "Shall the recommendation of President Eisenhower be accepted that the manned space flight program be confined to research and development beyond Project Mercury or should steps be taken to move the follow-on vehicle development?" The issue was joined in this colloquy between Dr. Dryden and Representative J. Edgar Chenoweth (Republican of Colorado):

Mr. CHENOWETH. We have great respect for you. You have changed your attitude a little bit here in the last few months.

Dr. DRYDEN. In what way?

Mr. CHENOWETH. You didn't present such a program when you were here before. What has caused the change in your thinking?

Dr. DRYDEN. Two or three months ago you had a document before you from President Eisenhower which said that he saw no reason for going beyond Project Mercury with manned flight. I could not submit this kind of budget under the rules as you know.

Mr. CHENOWETH. I don't think it makes much difference who is President of the United States.

Dr. DRYDEN. I think it makes a lot.

A few days after the new House committee hearings had concluded, the conference committee met on July 19 and accepted an increase of \$408 million beyond the authorization bill the House had passed on May 24.

Representative Perkins Bass (Republican of New Hampshire), fifth-ranked Republican on the House Science Committee, led the fight against the conference report. Representative Charles A. Mosher (Republican of Ohio) did not speak against the report, but he joined Bass in voting against it. Bass lost an important ally in his efforts to defeat the test endorsement of the manned lunar goal. Representative George P. Miller (Democrat of California), soon to become chairman of the House Science Committee in September, had teamed up with Bass to denounce the May 24 committee authorization bill when it reached the floor. In supplemental views and on the floor in May, Miller advised that we should move with "celerity" rather than with "haste and hysteria," adding: "We can ruin this program, we can ruin

our position in the world if we seem to think that we can buy our way with money through these programs." But in July, following the address of President Kennedy, Miller supported the committee and the President, and Bass was hard put to round up many allies for his opposition.

THE COMMITTEE AND THE LUNAR LANDING GOAL

On a rollcall vote, which can be interpreted as an endorsement of the manned lunar landing goal, the House of Representatives on July 20, 1961, voted 354-59 to authorize \$1,784,300,000 for NASA.

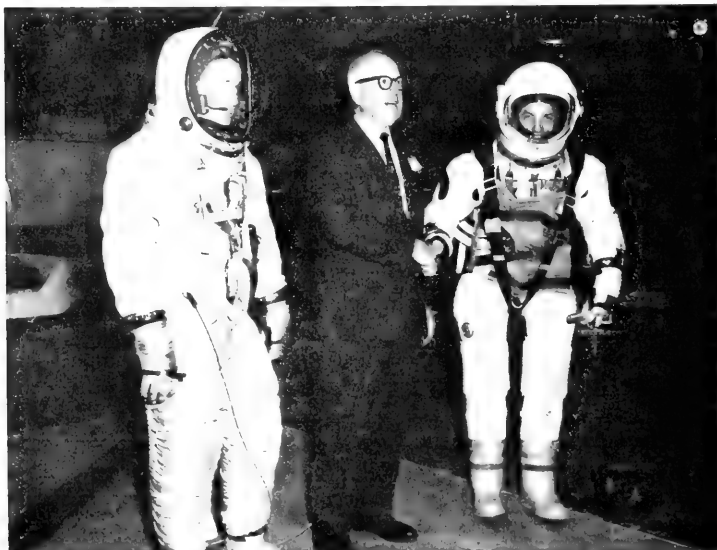
President Kennedy's bold stroke of leadership not only had a profound effect on the Nation, in mobilizing vast scientific, technical, and engineering resources toward the goal of a manned lunar landing; the decision itself immediately impacted on Congress and more specifically the House Committee on Science and Astronautics. The more glamorous aspects of manned space flight, which immediately attracted public attention, vastly expanded the work of the committee. The less publicized aspects of the space program—instrumented planetary probes, basic research, the tracking network, astronomy, and other fields—did not suffer from the light of the Moon, but received greater emphasis because of the increased public and congressional support for NASA. Likewise, the related scientific agencies like the National Science Foundation prospered rather than being squeezed out by the emphasis on Project Apollo. A major scientific revolution, including a surge of interest in education, was sparked by the decision to go to the Moon.

Once the committee had matured beyond the adolescent thrills of such glorious experiences as meeting astronauts and their families—which never ever ceased to be a thrill—the committee dug in to exercise genuine oversight over the agencies under its jurisdiction. The May 25, 1961, decision simply made the job bigger, more important, more exciting and more exacting. The job, to be done right, required travel and firsthand, on-the-spot investigation, a practice encouraged and stimulated by the examples set by successive chairmen—Miller and Teague.

The man who served the longest as NASA Administrator, James E. Webb, has referred to the 1961 decision as a goal rather than a commitment. Because of the difference in these two terms, the Committee on Science and Astronautics assumed greater importance each year in forging the congressional and public support toward that goal. Each year the battle had to be won over again, while at the same time carefully maintaining the necessary oversight to insure the maximum efficiency and economy in the program.



President John F. Kennedy, Representative Albert Thomas (Democrat of Texas), chairman of the appropriations subcommittee handling NASA and NSF funding; Representative George P. Miller, chairman of the House Committee on Science and Astronautics and James E. Webb, NASA Administrator, at Rice University, Houston, Tex., September 12, 1962.



Chairman Miller inspects astronaut training at Manned Spacecraft Center, Houston, Tex.

The Early Miller Years

As one of the few Members of Congress with a civil engineering background, Representative George P. Miller (Democrat of California) used to like to needle his lawyer colleagues in the House of Representatives this way:

You guys think in circles. I am one of the few guys around here who has been trained to think in straight lines.

Upon the death of Overton Brooks, George Miller officially was named chairman of the House Committee on Science and Astronautics on September 21, 1961. In the dozen years he served until January 3, 1973, Miller strengthened the committee's internal structure, broadened its activity in the scientific area, created the influential Subcommittee on Science, Research and Development first chaired by Representative Daddario, presided over the highly successful Gemini and Apollo programs under the jurisdiction of Representative Teague's Manned Space Flight Subcommittee, and also helped stimulate the growth of the National Science Foundation, international cooperation, weather and communications satellites, and the many unmanned space ventures handled by Representative Karth's subcommittee.

Born in San Francisco in 1891, Miller represented the East Bay area from the southern edge of Oakland south and eastward through Alameda, and towns like San Leandro and Castro Valley. Like Overton Brooks, he had served in World War I, graduating from the School of Fire for Field Artillery, Fort Sill, Okla., and was a lieutenant in the field artillery from 1917 to 1919. He was a practicing civil engineer both before and after the war, having studied engineering at St. Mary's College near San Francisco.

After running a travel agency that failed during the Great Depression, for a brief period he helped sweep the streets of Alameda, Calif., to qualify for relief allotments. This proved to be a good entrance into politics, and Miller served two terms in the California State Assembly from 1937 to 1941, and in 1941 became executive secretary of the California Division of Fish and Game. At the age of 53 he was elected to the House of Representatives in 1944, the same year Franklin D. Roosevelt was elected to his fourth term as President.

Miller gained some renown as the freshman Congressman who blew the whistle on Elliott Roosevelt for bumping one of Miller's serviceman-constituents from an airplane in order to ship Roosevelt's huge dog Blaze. On the Merchant Marine and Fisheries Committee, he became chairman of the Subcommittee on Oceanography, which he helped to create. His progress on the Armed Services Committee was much slower. "I sat on the Armed Services Committee for about 8 years," Miller told his committee in a frank executive session shortly after he became chairman. He confessed: "I was never quite taken into the confidence of the people to the extent you are. There was never an opportunity to serve on a subcommittee such as this, to bring this stuff right home to you." His experience on the Armed Services Committee, where he looked up toward Chairman Vinson and saw he was only the 14th in seniority, influenced Miller's decision to switch to the Science and Astronautics Committee. Reacting against Vinson's practice, Miller was liberal in delegating authority to subcommittee chairmen on his new committee.

CONTRASTS BETWEEN BROOKS AND MILLER

Early in Miller's chairmanship, a staff member remarked: "Under Brooks, I turned out three press releases a week. Now under Miller, there haven't been three in six months." At the organization meeting of the committee on January 17, 1962, Miller quickly organized standing subcommittees, gave them specific names and jurisdictions and encouraged the subcommittees to exercise full responsibility.

James R. Kerr, in a Ph. D. dissertation written at Stanford University, recorded in 1962 an interesting series of interviews with committee members and staff which were very frank because of their anonymity. "Brooks was more inclined to emphasize publicity for the committee, and put this ahead of the work of the committee. We covered a very broad area, but never got to the specifics of the program. * * * We have better cooperation and working together under Miller—there was a feeling of resentment that was there under Brooks," said one member.

A junior Democrat made this observation:

Under Brooks we had all full committee hearings—a parade of scientists, military men, civilian experts. But nothing was done about the specifics of the program. We didn't know where the money went. But subcommittees are different. You can get a close look at what needs looking at. Generally, you are confined to a small portion of the budget. Miller is a fine chairman, but Brooks served a valuable purpose although he epitomized the layman's point of view. He asked that kind of question. He sought publicity, educating the public.

Another committee member put it this way:

There were Brooks and Fulton, two prima donnas. It really became quite impossible with Brooks and Fulton acting like prima donnas baiting each other in

patronizing but insulting terms. Brooks kept all authority right in his hands. He never passed around opportunities to participate in floor debates on the authorization bills. * * * Miller is a more practical, down-to-earth chairman, and we are all grateful for the change.

Another member of the committee indicated that there had been a change of attitude when Miller acceded to the chairmanship:

Since he has become chairman, he has become much more conservative, loath to move. His attitude has now become don't rock the boat, keep relations with NASA smooth and unruffled. * * * He was a much more vigorous questioning committee member when he was the ranking majority member. Perhaps becoming chairman makes one become more fatherly and protective. He is, without doubt, a great improvement over Brooks in every sense.

In stressing the independence and responsibility of the subcommittees from the start, Chairman Miller built up respect and a high morale among both members and staff. Republican members of the committee were particularly strong in their praise of the Miller regime, and the bipartisan approach to issues which arose. Some members stated that Chairman Miller had a "short fuse," but they all commended his fairness and genuine prestige that developed as the committee delved into new areas.

Of medium height, gray haired, bespectacled, possessed of a good sense of humor, a good storyteller and wonderful traveling companion, Miller was inclined to deal arbitrarily with those who disagreed with him on the committee. But he never held grudges. There were times when staff members and members of the committee felt that his wide-ranging anecdotes, reminiscences and philosophical observations, although interesting and stimulating, were time-consuming. Yet Miller earned and won the respect of his committee and colleagues, and through his service raised the prestige of the committee.

On May 2, 1962, the following exchange took place between Miller and Teague, who at the time was also chairman of the Veterans' Affairs Committee:

Mr. TEAGUE. The Speaker of the House recently called a meeting of all the committee chairmen. I was the only committee chairman that had a chance to comment on another chairman. I told him I had a complaint, that I had a chairman that was working the hell out of me, and that was the chairman of the Space Committee.

Mr. MILLER. Brother, you asked for it. You ain't seen nothing yet.

RELATIONS WITH NASA

Quite naturally, NASA officials all preferred the Miller chairmanship to the Brooks chairmanship, even though it meant far more work on details than Brooks had required. Under Brooks, NASA never knew when they would receive a quick summons, after a space spectacular by either Russia or the United States, to appear before the committee in a public hearing with little time to prepare. It was Miller's habit

to call Webb frequently on the phone, sit down with Webb in his office, have lunch with him, and even ask Ducander to call Webb personally to straighten out any problem.

Webb recalls:

We worked very closely together. As a matter of fact, Congressman Miller had asked me when he became chairman of the committee how we could best work together. After we had discussed this for some time, he decided to set up subcommittees patterned very much after the NASA structure. So there was a Committee on Manned Space Flight dealing with Dr. Mueller, and Mr. Brainerd Holmes before him, in the field of Manned Space Flight.

There was a Committee on Science which was dealing with the scientific side of NASA—our structure, our organizational structure, fitted in very neatly with the committee structure of subcommittees. And this meant that the people in the subcommittees that the committee would look to for final judgments were in close personal contact with people in NASA who were working in the same field. And they developed an intimate working relationship.

With relation to informal contacts and committee trips to installations, Webb also recalls:

We brought the subcommittees of the House Committee on Science and Astronautics which is now the Committee on Science and Technology together with our important leaders for a face-to-face contact at a small, intimate hearing. And it was after this basic laying of groundwork and understanding that Congressman Teague and many others went out then to the centers to see what was going on, to the contractors' plants that were doing the work.

MEMBERSHIP AND SUBCOMMITTEE ORGANIZATION

When the 2d session of the 87th Congress convened in January 1962, the following Members constituted the Science and Astronautics Committee:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Victor L. Anfuso, New York
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 Walter H. Moeller, Ohio
 David S. King, Utah
 J. Edward Roush, Indiana
 Thomas G. Morris, New Mexico
 Bob Casey, Texas
 William J. Randall, Missouri
 John W. Davis, Georgia
 William F. Ryan, New York
 James C. Corman, California
 Thomas N. Downing, Virginia
 Joe D. Waggoner, Jr., Louisiana

Republicans

Joseph W. Martin, Jr., Massachusetts
 James G. Fulton, Pennsylvania
 J. Edgar Chenoweth, Colorado
 William K. Van Pelt, Wisconsin
 Perkins Bass, New Hampshire
 R. Walter Riehman, New York
 Jessica McC. Weis, New York
 Charles A. Mosher, Ohio
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Thomas M. Pelly, Washington

Subcommittee on Manned Space Flight, Olin E. Teague, *Chairman*

Subcommittee on Advanced Research and Development, Victor L. Anfuso, *Chairman*

Subcommittee on Space Science, Joseph E. Karth, *Chairman*

Subcommittee on Applications and Tracking and Data Acquisition, Ken Hechler, *Chairman*

Subcommittee on Patents and Scientific Inventions, Emilio Q. Daddario, *Chairman*

Special Subcommittee on Women as Astronauts, Victor L. Anfuso, *Chairman*

Special Subcommittee on Solid Propellants, David S. King, *Chairman*

JURISDICTION

"We have some very grave responsibilities in the field of our work in connection with the Science Foundation, and very serious, responsible work to do with respect to the Bureau of Standards. * * * There are many matters pertaining to education and supply of scientists in this country that we have a grave and direct responsibility for," Chairman Miller told his committee in executive session on April 16, 1962. Miller was determined to broaden the work of his committee into scientific areas beyond space, and also to stress the development of unmanned activities without excluding the more spectacular Apollo program.

On May 2, 1962, at an executive session of the committee, Representative Karth asked what course of action should be taken on the communications satellite bill coming up before the Rules Committee. Chairman Miller responded:

"As far as I'm concerned, this is a matter that is fully within the jurisdiction of the Committee on Interstate and Foreign Commerce." Representative Chenoweth contended that he felt there was a "twilight zone" and the committee should not abdicate jurisdiction. Perhaps recalling the stiff challenge which Interstate and Foreign Commerce Committee Chairman Oren Harris had made in 1961 in a floor discussion of Science Committee hearings on communications satellite research, Chairman Miller backed off. Miller stressed that although research and development were clearly within the Science Committee jurisdiction, commercial use was not.

With the creation of the Science, Research and Development Subcommittee in 1963 under the chairmanship of Representative Daddario, Miller very positively asserted the jurisdiction of the committee in all areas of science. The circumstances of the establishment of the new subcommittee are covered in the next chapter.

In general, there was a marked difference between the policies of Chairmen Brooks and Miller in their approach to jurisdiction. With Brooks, it was a case of damn the torpedoes full speed ahead, push the jurisdiction upward and outward as fast and as far as time allowed. Brooks always reacted with bland and suave surprise when another

committee hinted or came right out to say he was treading on forbidden jurisdictional grounds. Miller ran the committee in a far more orderly fashion, politely declining to get involved in jurisdictional squabbles, and shunning a stance that grabbing for power was the mark of a successful committee chairman. He was a team player.

At the first organizational meeting of the committee in January 1962, Chairman Miller was asked whether he would press for authorizing power for the committee in the case of the Weather Bureau and the Bureau of Standards. Chairman Miller answered in the negative, explaining:

It isn't something you can go out to do with a bludgeon. It takes a lot of persuasion and we have to remove a lot of resistance that may come. * * *

It was Chairman Miller's view that the committee had plenty to do without reaching out for vastly expanded jurisdiction. He preferred the orderliness of good management to the frenetic, frantic efforts of his predecessor to flail out in all directions.

STAFF OPERATION

Morale under Chairman Miller rose immediately and sharply. Staff Director Charles Ducander had a bad case of the flu when Chairman Brooks died, and could not even attend the funeral. But Miller called and asked if he could come over to Ducander's house. There he asked Ducander to stay on in his capacity as staff director. On the rest of the staff, he asked: "What do you think? Should we keep everybody?" Ducander replied affirmatively.

Ducander described his relationship with Miller in the following way:

I was in Mr. Miller's office no less than three or four times a day, every single day. *** I was down in his office starting about 9 in the morning, and I always had a list of things: "George, tomorrow, this, this, this, this * * *." This came from my interrogation of staff members: "What did you all do yesterday? You had some hearings. What did you talk about? What did you do? Who said what? Did anything happen of importance?" * * * Well, now all these things were never written down and Phil Yeager would come in and tell me what he and Daddario were doing and this sort of thing, just in a conversational way, and I would take a few notes. And the next morning in my briefing with the chairman, it was like somebody comes in and briefs the President every morning. I thought this was my duty to keep him informed, and he liked this.

That's the way it operated. No written memos. That's why you can't find any of this in the files, because it seems to me it's ridiculous that if Mr. Miller wanted to hear it, he didn't want to read it in a memo.

Chairman Miller's philosophy on staff was that a staff which was lean and hard-working was more efficient. He wanted good people who were paid good salaries and then expected to get the job done without

a lot of independent pools of power, or lack of coordination. Both Brooks and Miller inherited their attitudes from the staff of the Armed Services Committee, on which they had both served, and where there was a very small professional staff which furnished support to both majority and minority Members.

Although Representative Martin was the ranking Republican, Representative Fulton assumed most of the prerogatives of the senior Republican and spearheaded an effort to obtain special staff for the minority. Chairman Miller's customary response was that no committee in the Congress was less partisan in its attitudes than the Science and Astronautics Committee. It is certainly true that the spirit of bipartisanship dominated the Science Committee. On the other hand, the minority, if properly staffed, would have been better equipped to fight against political decisions such as the location of the Electronics Research Center. Eventually, the Science Committee was provided with minority staff, largely because of powerful forces outside the committee itself. Once the Republican Members of the House presented a united front and made the issue of a minority staff their Holy Grail, the Science Committee bowed to the pressure and allocated separate staff for the minority. But it was a long and agonizing fight, stubbornly and narrow-mindedly resisted by Chairman Miller every step of the way.

In addition to Staff Director Ducander, the following staff professionals were on board during the early Miller years:

Spencer M. Beresford, a lawyer and veteran of the select committee staff, who left the Science Committee on June 30, 1962, and later joined NASA.

W. H. Boone, a technically trained electrical engineer, with experience in military applied research in the Department of Defense, who joined the staff August 6, 1962, and remained for ten years.

John A. Carstarphen, Jr., a Louisiana lawyer recruited by Chairman Brooks, who initially assisted on the Anfuso Subcommittee on Advanced Research and Technology, and later became chief clerk of the committee, remaining throughout the Miller years.

Frank R. Hammill, Jr., a lawyer with Pentagon and FBI experience who joined the committee February 29, 1960, worked primarily for the Karth Subcommittee on Space Science and Applications, and served until 1979 as counsel on the Science and Technology Committee.

Richard P. Hines, a writer and veteran of the select committee, who remained with the Science Committee until March 31, 1973, working mainly on tracking and data acquisition, and advanced research.

Raymond Wilcove, another veteran of the select committee, a journalist, who assisted in staffing the Advanced Research Subcommittee, and remained with the Science Committee until March 10, 1963.

Philip B. Yeager, counsel, also a veteran of the select committee staff, lawyer and journalist, who initially staffed the Manned Space Flight Subcommittee and the

Mitchell and Daddario Patents Subcommittees. Later served as staff director of the Subcommittee on Science, Research and Technology. Over the years, Yeager has been identified with perhaps more successful hearings and reports than any other staff member, and in 1979 was appointed General Counsel.

Chairman Miller continued the practice initiated by Chairman Brooks of asking for the detail of a series of Army, Navy, and Air Force officers who served tours of duty an average of one year apiece, and assisted the professional staff of the committee in its work. Among the abler and more effective military officers assigned to the committee were Col. Earl G. Peacock and Lt. Col. (later Col.) Harold A. Gould. (Gould became deputy director in 1975 and executive director in 1979.) Chairman Miller discontinued the practice of assigning military officers in 1964, and it has not been revived since.

At the close of 1961, when Representative Miller assumed the chairmanship, there were 11 professional and 6 clerical members of the staff. At the close of 1962, the staff had dropped to 10 professional and 6 clerical. The size of the staff increased very slowly in the ensuing years, and the number of the staff members under Chairman Miller reached a high point of 17 in 1971. One of the notable additions in 1963 was James E. Wilson, who was appointed staff director of the Manned Space Flight Subcommittee when Philip B. Yeager moved over to become staff director for the Subcommittee on Science, Research and Development. Wilson had been Director of Research and Development for the Naval Propellant Plant in Indianhead, Md.

DELEGATION TO SUBCOMMITTEES

Chairman Miller's wise decision to delegate responsibility to the subcommittees was universally applauded by all the committee members and staff. To be sure, some officials in NASA grumbled that the authorization hearings were too long and too detailed. Other critics tried to argue unsuccessfully that the Senate Aeronautical and Space Sciences Committee members in House-Senate conferences had a broader picture of NASA operations, but these critics quickly conceded that there were few areas of NASA operations that some House committee members didn't know best. But the predictable effect of subcommittee specialization was that more committee staff was desperately needed.

Nearly all the committee members indicated they needed more complete briefings in preparation for the hearings on authorization bills, investigations, and for general understanding of the issues involved in the policy decisions confronting them. Time after time, committee members stated that they had to "accept so much of the agency presentations on faith," instead of having the staff personnel

to probe into the full justification of millions of dollars. In any area under the committee's jurisdiction, whether it was NASA, the National Science Foundation, the Bureau of Standards, or any other agency, the committee members felt that they were supporting a scientific and engineering program which Congress wholeheartedly wanted to be successful. After all, the committee had been prodding NASA for several years to spend more, go faster, get the job done with greater urgency. At the same time, cost-conscious members wanted to have the tools to differentiate between essential expenditures and waste or "padding."

The situation became critical in the early 1960's as NASA's budget ballooned upward. Committee members faced a billion-dollar budget at the beginning of 1961. By July, following the decision to go to the Moon, the administration was asking Congress for \$1.7 billion. By the beginning of 1962, the new budget was over twice that big, and in the next few years the budget continued to soar until it leveled off at between \$5 billion and \$6 billion in the midsixties. To understand and grapple with these massively expanding programs required extensive staff assistance to do the job right.

"I'm all in favor of accelerating the space program, but I don't want to remain so ignorant about the program that I overlook these critical areas where investigations should be made," said Representative Karth early in 1962 in citing the need for more committee staff. Teague echoed the need for more staff, adding: "I studied animal husbandry. And nobody else on the committee is a scientist either. I just had to work overtime—reading all kinds of stuff and got help wherever I could—NASA, the Air Force, industry—every place I thought I could learn something."

Representative Anfuso joined his fellow subcommittee chairmen in pointing out that the Science Committee had a much tougher job than the Armed Services Committee, because the latter had a backlog of experience and knowledge to draw on, as well as guidelines to measure performance.

Representative R. Walter Riehlman (Republican of New York) stated in a committee executive session that "our committee has been lacking in a staff that is qualified to follow thoroughly these programs and be of assistance to members in evaluating them." Riehlman particularly noted the absence of scientists or engineers on the staff. Representative Mosher was somewhat blunter in his assessment. When his subcommittee chairman, Representative Anfuso, made the grand gesture of telling the subcommittee that "each member has become almost an expert," Mosher responded:

I would say that if I am an expert, then Lord help the Nation. I think it is a frustrating experience for all of us in this new world we are dealing with, that we

have to accept so much on faith. I would like to echo what has been said earlier in the morning, that there is, I think, a desperate need for more technically trained staff assistants for us.

Chairman Miller adroitly sidestepped the many requests for additional staff, and adhered to his determined plan to keep the staff reasonably small and controllable. When the pressure got heavy Miller pleaded that there was insufficient space to house additional staff. But even when the committee moved to more spacious quarters in the Rayburn Building, when the space was available, the staff remained small.

The major functions of the staff did not differ materially from what they had been during the Brooks years. But the organization, tone, and logic showed marked improvement. Under Chairman Miller, there was more advanced planning of hearings, scheduling of witnesses, and less of a tendency to summon high-ranking officials to coincide with spectacularly newsworthy events. There was a marked increase in the number of inquiries from Members to staff. These were generally routed through Ducander, except of course for the subcommittee matters being handled by the regularly assigned staff members. Chairman Miller frequently expressed to those pressing for expanded staff that he was against using the staff to handle congressional constituent business (even though this was not contemplated).

Chairman Miller stressed the value of field trips and foreign trips, and he encouraged all committee members to visit not only NASA installations but also the Bureau of Standards and other scientific centers. Some committee members, notably Hechler and Fulton, made some attempts to expand the staff through a series of field investigators who could monitor the work at the various installations and then report back to the committee. As it turns out, field intelligence was derived almost entirely from trips to installations. And the staff continued to accomplish an almost superhuman amount of work in staffing hearings, conducting investigations, and producing a wide variety of useful reports.

ADDITIONAL ASSISTANCE

The committee made good use of the General Accounting Office, yet concluded that the accent of its investigations was on administrative performance and accounting, monetary, or budgetary matters. The committee members clearly felt the need for more technical, scientific, and engineering assistance beyond what was being supplied by the Legislative Reference Service of the Library of Congress. In later years, largely through the stimulus of the Committee on Science and Astronautics, LRS created a Science Policy Research Division in 1964. But in the early 1960's, when there were complex policy decisions to be

made in rapidly expanding areas of space and science, committee members struggled with the problem of how to get objective information and advice.

As noted in chapter II, Chairman Miller strengthened the use of the Panel on Science and Technology which had been started by his predecessor in 1960. Under Miller's leadership, the meetings of the panel were held more frequently, the focus of the meetings was sharper and members had opportunities for airing some of the current committee policy decisions while panels were in session. One member suggested that the panel should be called on more frequently to backstop the staff, and to answer questions by members between the times the panel was actually meeting in Washington. It was felt that this would be too much of an extra burden on the hard-working panel members.

A similar suggestion was made by Representative Mosher: "Personally I like the idea, recently suggested by several people, that the standing committees should be able to employ science specialists for brief periods of time, and for rather intensive work during those periods—preferably scientists who have some knowledge of Government's relations to scientific activities and some understanding of the congressional process as such." Later, the Daddario Subcommittee on Science, Research and Development established a Research Management Advisory Panel, which proved very successful, yet its primary assistance was provided to the Daddario subcommittee. In the period when tough decisions were being made on the space program every day, a majority of the members groped and grasped for the tools to do the job.

Some members rationalized their lack of staff help by contending that Congressmen were supposed to react like their taxpaying constituents in measuring the value of complex programs. It was further argued that Congressmen should be generalists and not be armed with the specialized knowledge which might bias their decisions on behalf of one particular phase of a program. But most of these arguments seemed to apply to the qualifications of the Congressmen themselves, rather than go to the heart of the issues.

By its field trips to NASA installations, by its insistence that NASA witnesses express themselves in "everyday English," and by working long hours, the Manned Space Flight Subcommittee was probably as well informed as any subcommittee. Yet in the early 1960's, it was this subcommittee which really led the fight for more and better staff assistance. On April 11, 1962, the subcommittee had this discussion in executive session:

Mr. RIEHLMAN. I want to make the statement * * * that the chairman be advised that as far as I am concerned—and I think it should be unanimous that we should be provided with a staff sufficient to follow this program through and to see that we

have continuous information as to the manner in which these funds are being spent, and that we be conversant from time to time with the progress being made in every one of these facilities and programs that are carried on.

Mr. TEAGUE. Yes.

Mr. MORRIS. Not only in facilities, but in research.

Mr. TEAGUE. The chairman of the committee has told me that as soon as we get through with this authorization that he wanted to go into the reorganization of the committee and staff. Now, might we write a letter from this subcommittee, signed by all members of the subcommittee, to the chairman, setting forth what you have said? Would you draw up a proposed letter, Duke, and give each member a copy? Let them make suggested changes, and let each member of the subcommittee sign the letter to the chairman.

Mr. DUCANDER. Yes; if I were asked, I would agree, that at one time, we didn't even have a man in the office to answer questions that Members of Congress call us on all the time. The girls had to just take messages down there and ask us.

Mr. RIEHLMAN. We have to impress on his mind that this subcommittee has had a heck of a lot of responsibility here, and we want to be sure from now on we will have help.

Mr. FULTON. I might say, at one point in these subcommittee hearings, the chairman and I have each pointed out that we need a staff of an investigatory nature, and need them to be competent, so they are able to evaluate. We need, really, a scientific contractor approach to it, that the General Accounting Office couldn't give us, and frankly said they couldn't, in these hearings. How many slots are open? Five?

Mr. DUCANDER. Mr. Fulton, it is not a matter of vacancies, it is a matter of money, and we have plenty of money. We are going to turn back, if we go as we are going now, about \$95,000.

Mr. TEAGUE. Unless we do this, the Government Operations Committee will be over on this committee taking over our job.

Before the full committee five days later, Representative Fulton said: "I think Tiger Teague and I, as well as the other members of the committee, such as Tom Morris (Democrat of New Mexico) have recommended that we immediately get technically trained people with a background in this field, that we can follow these programs and follow them carefully."

In response, Chairman Miller stated: "May I say this, that one of the reasons you haven't got some technical assistance now is you haven't any place to put technical assistants."

On August 7, Chairman Miller introduced W. H. Boone, a graduate of Mississippi State College with an electrical engineering degree, as the "first purely technical member we have on the staff." This prompted Representative John W. Davis (Democrat of Georgia) to quip:

A great deal has been written about the fact that the Republican Party does not have an adequate representation on the staff. I would simply like to welcome Mr. Boone as a representative of the Confederacy.

Boone proved to be a good staff member on the scientific and technical side, but others showed that the greatest talent provided by the committee staff was in the area of management. The best staff members were those who sensed the right policy and management questions to ask, could challenge bureaucratic practices and see through efforts to gloss over problems, and could write clearly and simply—traits not always possessed by the technical “experts.”

At the final executive session of the committee for 1962, held on September 26, Chairman Miller expressed the “hope that in the not-too-distant future we can get physical facilities that will allow us to expand the staff. We could have expanded the staff, but we would have no place for them to work. We examined this quite thoroughly. They would be sitting in one another’s laps.”

In the final analysis, Chairman Miller simply resisted the efforts of his committee members to gain more staff assistance, and he was chairman in the days when revolutions were generally unsuccessful.

THE COMMITTEE AND THE MERCURY PROGRAM

The Russian cosmonauts were the best thing the American space program had going for it. Gagarin jolted America toward speedier action leading to the May 25, 1961, decision to go to the Moon. After the successful suborbital flights of Alan Shepard and Gus Grissom, NASA hoped to go for a three-orbit flight to beat Gagarin’s one-orbit effort. Then along came Cosmonaut Gherman S. Titov with a day-long, 17-orbit flight on August 7, 1961. Instead of a drop in public support for the Mercury program, the Titov flight seemed to rally public opinion behind John Glenn as he prepared for three orbits of the Earth.

Delays plagued the Glenn blastoff during January and early February. Some members of the committee were irked at some more headline-grabbing by the ranking Republican, Jim Fulton, who remarked after an unsuccessful launch attempt on January 27, 1962, that the Mercury capsule and Atlas booster were “a Rube Goldberg device on top of a plumber’s nightmare.” Trouble had developed in one of the bulkheads of the Atlas booster. Dr. Robert R. Gilruth, Director of the Manned Spacecraft Center, had no recollection of Fulton’s statement, which made the front page of the Washington Post. But Gilruth did remember one Congressman who made no public statements or press releases at the time:

Mr. Teague was with us during those real key times—like just before we orbited John Glenn. We had so much trouble with the Atlas rocket with the bulkhead. * * * He was always right there, and he was always supportive. It was good to have somebody who could understand and help you like he did.

On February 20, 1962, Glenn completed his flight, and returned to the cheers of millions throughout the country. Just one week later, Glenn, Grissom, and Shepard made a dramatic appearance on behalf of the \$3.7 billion NASA authorization bill as hearings were kicked off before the Science and Astronautics Committee.

Hoarsely, Administrator Webb rasped:

I regret that my voice is not very good today. In common with many of our fellow citizens, I think I have almost worn it out cheering for Colonel Glenn and the tremendous achievements which the Mercury team has performed.

When Chairman Miller commended Webb for his "push and drive," Webb responded: "The atmosphere here is a little bit different than the day I appeared before you after the first Russian flight."

THE COMMITTEE AND NOVA

Weightlifting was the name of the game in the early days of the space program. It was a simple proposition understood by every schoolboy that Russia had a big lead because she had bigger boosters. To get to the Moon obviously required far bigger launch vehicles than we possessed. For the two-man Gemini missions, the Air Force Titan was used, while NASA was developing the Saturn for the three-man Apollo mission. At the same time, the gigantic Nova was designed for direct ascent to the Moon and return.

By early 1962, a clear-cut decision had not yet been reached on whether the manned lunar trip would be by direct ascent, by Earth orbit rendezvous or lunar orbit rendezvous. Nova was the alternative if direct ascent were the way to go. Nova was also projected as the big truck which would carry flights to the planets and perform deep space probes.

The Nova program was so massive as to defy the imagination. The idea was to cluster eight engines in the first stage with a thrust of 1.5 million pounds apiece for a 12 million pound thrust. Other versions increased the thrust up to 20 million pounds. The launch and test facilities required construction costs which ran into hundreds of millions of dollars.

The committee was appalled at the size and fuzziness of the justifications for the huge Nova expenditures, which in the fiscal year 1963 totaled \$163 million for research and development, something over \$60 million downpayment on launch facilities at Cape Canaveral, and over \$12 million for test facilities in Mississippi.

Teague had his doubts about Nova from the start. On February 28, 1962, he asked Dr. Seamans: "How much would you lose if you cut down the Nova program to just surveying and engineer studies, but

go ahead with your engine?" Seamans answered: "We will carry out the development of the Nova rapidly enough so that if the rendezvous does not prove to be a satisfactory method, we can still get to the Moon by the end of this decade by direct ascent. However, we think we can get there a year sooner using advanced Saturn in rendezvous than by direct ascent."

On March 26, 1962, D. Brainerd Holmes, Director of Manned Space Flight, testified before the committee that "It appears to be logical to carry on the parallel although somewhat later Nova approach due both to the uncertainties as to the difficulties which may be associated with rendezvous, and due to the fact that we will undoubtedly need these more powerful launch vehicles for explorations deeper into space."

Representative Richard L. Roudebush (Republican of Indiana) raised the question:

We find ourselves spending billions on a rocket, Nova, that would be old fashioned, if I could use that term, by the time the engineering was completed.

On April 4, Teague asked Milton W. Rosen, Director of Launch Vehicles and Propulsion:

Mr. Rosen, is there any wild guess what this Nova total will be?

Rosen responded:

I would say for vehicle development alone, assuming a 10-vehicle program, we should expect a program of about \$2 billion.

Chairman Miller used this simile to describe transporting Nova:

This is almost like rolling the Empire State Building back and forth a couple of blocks.

During the debate on the NASA authorization bill, on May 23, 1962, Miller prophetically suggested that:

In the next year or two, if we meet with success in the orbital rendezvous techniques we will want to take another hard look at the Nova program to see if this vehicle is really needed for manned space flight explorations.

The Teague subcommittee moved ahead to prod NASA on a major policy decision. It was not a case of the committee substituting its judgment for that of NASA. Rather, it was a subtle type of pressure on NASA to make a decision on what kind of a mission they really had in mind for Nova and to relate that decision to a more precise definition of how they planned to get to the Moon. In the spring of 1962, NASA officials still had their options open among the various possibilities—direct ascent, earth orbit rendezvous or lunar orbit rendezvous.

In the decisionmaking process, Teague took his subcommittee to the Cape, to Huntsville, to Houston, to visit with contractors, to talk informally with the astronauts, and to listen, learn, question, argue, and challenge. Something had to give. Meeting in executive session on April 11, 1962, the Teague subcommittee took its first step to kill Nova. The subcommittee voted to cut out of the authorization bill \$60,630,000 of construction funds for the gigantic Nova launch complex at Cape Canaveral. The subcommittee then slashed \$12 million from the Nova test facility in Mississippi. Nova was not terminated, because funds were left in the bill to carry forward the research and development, but the committee sent a clear signal to NASA that Congress wanted a better justification for such a gigantic project with a loosely defined mission.

NASA responded to the committee prodding. On July 12, 1962, D. Brainerd Holmes, Director of the Office of Manned Space Flight, made a special appearance before the committee to present NASA's clear-cut decision to proceed with the lunar-orbital rendezvous method of landing on the Moon.

On both sides of the aisle, committee members praised NASA for the manner in which the decision was presented to the committee. Daddario stated:

I am sure that because of this candid approach that you will get better, and stronger support from the Congress.

Riehlman added:

I feel confident that it is this type of presentation that will assure you of closer cooperation with the committee and more favorable consideration in the future.

Hechler made these remarks to the committee, in commenting on the choice presented:

I think this will go down as a classic in decisionmaking. History will tell whether it is right.

Chairman Miller concluded the hearing by noting:

I think it evidences the good relationship existing between NASA and this committee.

The decision itself resulted from very thorough studies and excellent arguments by John Houbolt and others of Langley Research Center. It served to sharpen the committee's determination to push NASA on the issue of what was planned for Nova.

Nova did not die easily. NASA continued to request funds for advanced research on a post-Saturn vehicle. In 1963, von Braun clearly pointed out that Nova was "on the back burner." He did not give up on its future use, but confessed that "when we shall have enough money to go into high gear with Nova we would not want to base it on a concept that we developed in 1962."

The President's Science Adviser, Jerome Wiesner, as well as some members of the President's Science Advisory Committee, continued to press their opposition to lunar orbit rendezvous, even after NASA had announced its decision in July 1962. The opponents of lunar orbit rendezvous brought their case to Teague. This prompted Teague, who knew that von Braun had been one of the strongest early advocates of Earth orbital rendezvous, to put the question to von Braun during the March 18, 1963, committee hearings:

Mr. TEAGUE. Is there disagreement within NASA as far as the method of going to the Moon is concerned?

Dr. VON BRAUN. None whatsoever.

Mr. TEAGUE. In Houston, we were told that the astronauts were unanimous in their belief that this was quicker, cheaper, and safer.

Dr. VON BRAUN. We believe so too. I am aware that there have been some statements to the effect that it was a bit surprising that Marshall, after having advocated Earth orbit rendezvous, came around and recommended lunar rendezvous.

Fact is that at first we put a great deal of work into the lunar orbit rendezvous mode also, and now we are convinced that this is the fastest and safest way to go.

Henceforth, the committee reacted negatively whenever the word Nova came up. In response to critical questions as to why funds for Nova advanced vehicle studies were included in the fiscal 1964 budget, a red-faced Brainerd Holmes confessed:

Nova as used here is a little misleading. * * * I think the terminology in the (budget) book is a little unfortunate.

The committee wanted to be absolutely sure that money allocated for advanced research was not actually being used to revive the program which the committee had helped to kill. On May 8, 1963, Brainerd Holmes and his deputy, Dr. Joseph Shea, had to clarify this point:

Mr. DADDARIO. Nova, as used here, does not mean what we understand Nova to mean a year ago?

Mr. HOLMES. That is correct—

Dr. SHEA. There is a wonderful definition that comes from science about Nova. I have forgotten exactly how it goes, but I think it says: "Nova is often the brightest object in the sky for a short period of time, but then it wanes."

Mr. FULTON. This committee helped put that particular Nova program into history. It went into history around this table.

But even then, the Nova program dribbled along for another year. Finally, in 1964, Edward Z. Gray, Director of Advanced Manned Missions for NASA, walked into a lion's den by presenting the Manned Space Flight Subcommittee a chart which mentioned another advanced mission study of Nova. Representative Fulton was infuriated:

From this chart it appears you have resurrected the Nova concept. I thought that concept had met a fast death before this committee some time ago. How did it

get back into operation again? * * * How much money are you spending on the Nova concept?

Mr. GRAY. We are probably spending about \$75,000 trying to identify its characteristics as related to launch facilities and launch operations.

Maxime A. Faget, Assistant Director for Engineering and Development at the Manned Spacecraft Center, also worked on one version of Nova which would cluster huge solid rockets as a first stage. "We called the individual solid rocket 'the Tiger,'" explained Faget. "We figured it would be a noisy animal and would roar like a Tiger." Of course, Faget was not at the hearing to explain what he had in mind. But the real "Tiger" left no doubt where he stood on the whole question of Nova. The following exchange took place between Teague and Gray:

Mr. TEAGUE. If I were you, I would never use the word "Nova" again.

Mr. GRAY. We never will, so help me.

PROTECTING LAUNCH OPERATIONS

Ordinarily, Tiger Teague did not respond to anonymous phone calls. But this one had a strange ring of truth to it. "What happened was that I got an anonymous call from either Jacksonville or Atlanta," Teague explained. It was a tip that the Air Force was plotting to take over title to the expanded NASA launch facilities at Cape Canaveral.

Throughout the late summer of 1961, negotiations between the Air Force and NASA went on to define the details of NASA's proposal to buy over 80,000 acres of land for \$60 million, to become the Nation's major space launch base. When agreement was reached, NASA authorized the Corps of Engineers to proceed with the purchase, using reprogramed funds left over from having abandoned the Nova program.

Kurt Debus, Director of the Kennedy Space Center, got together with Maj. Gen. Leighton Davis, the Air Force commander of the Atlantic Missile Range, to work out an agreement which was subsequently ratified by Webb and Deputy Defense Secretary Roswell Gilpatric. Once the land was purchased, General Davis surprised Debus by informing him that title to the land should be transferred to the Air Force because they owned all the previous Atlantic Missile Range land.

Teague called Webb and Gilpatric into his office to find out what had motivated this power play, but at this level both officials insisted that everything was sweetness and light. "So I just picked up the phone and called the Corps of Engineers," Teague said, and the corps confirmed the Air Force efforts to obtain title to the new land.

Meanwhile, down at the Cape, Teague and his subcommittee began to poke around some more. They discovered that space agency

officials were very concerned about the safety factor of Titan III flyovers. So Teague ordered his subcommittee to probe the whole issue of range management at the projected Gemini and Apollo launch facilities at Cape Canaveral.

On March 29, 1962, Teague summoned Assistant Secretary of Defense John H. Rubel and Dr. Seamans in an executive session before the Manned Space Flight Subcommittee. Teague told Rubel:

The main thing that troubles the committee is, we go to the Cape, for example, we talked with some of your responsible people there, we talked with some of Dr. Seamans' responsible people and we came away confused, frustrated, disturbed, and they don't agree on this overflight matter, and they don't agree to a Titan sitting next to a Saturn * * *. We have some questions we are going to submit to you, Mr. Rubel and Dr. Seamans, which we want answered for the record.

Gen. B. A. "Benny" Schriever, head of the Air Force Systems Command, came up to lobby Teague in his office, but Teague pronounced: "I want NASA to administer the land and its launch center."

It took another NASA-DOD agreement, signed by Webb and Secretary of Defense McNamara, to establish that NASA was more than a tenant but could freely plan its own operations on the 87,000-acre Merritt Island launch area.

The average congressional committee would have received testimony from the responsible top officials, and tried to resolve any disputes at the very top. The Science and Astronautics Committee and its subcommittees, given free rein by Chairman Miller, went out to the contractors, the NASA centers throughout the country, sought the advice of independent experts, talked to the workers in the plants and their foremen, and had a real understanding of what was going on in every program.

Teague describes the efforts of the Air Force to prevent NASA from establishing a machine shop to repair minor parts needed at the Cape. "They would assign a bunch of bright young Air Force colonels to lobby the committee," Teague recalls. "They did everything on Earth to try * * * to get control of the space program." At one of the subcommittee parties at the Cape, an Air Force officer at Patrick Air Force Base was describing to one Science Committee member that his machine shop wasn't very busy, and that it would be a waste of money to set up a separate NASA shop. As Teague describes it:

The next morning, I got up early, and went by cab to the machine shop. There was a major in charge. I told him who I was, and that I just wanted to go through.

I asked him how busy they were. They were so busy they couldn't even begin to keep up. They would be running 24 hours a day. They could not do any more work.

Teague relayed the word to the Air Force officer at the base in no uncertain terms that "you say one more [deleted] word to my commit-

tee, I will put you under oath and make you testify. You just stay out of this."

Chairman Miller encouraged Teague and the other subcommittee chairmen to poke around whenever necessary, to travel extensively, and to expand their oversight functions on a personal basis. When Teague gave his subcommittee report in 1962, Miller commented:

Of course, I don't want to say too much about Teague, because I used to sit right below him on the Committee on the District of Columbia. I was in the lower tier. He was in the upper tier. Anytime I didn't vote right, he didn't do as I do with many, and try to reason with him. He used to just reach out and conk me on the head. I can show you the bumps.

Glancing toward two bald-headed members of Teague's subcommittee, Representatives Daddario and Tom Morris of New Mexico, Miller remarked: "You see, you haven't any padding like I have." On behalf of the bald-headed members, Morris had this to say about Teague:

He is a fine chairman. However, I am not too impressed with that habit he had of throwing the gavel at junior members of the committee at times.

Daddario added: "His aim is usually very bad, Mr. Chairman."

The inquiries by each subcommittee were searching, grueling, exhaustive for both members and witnesses, but not without their lighter moments. Maj. Rocco A. Petrone, Chief of the Heavy Space Vehicles Systems Office at Cape Canaveral, had been testifying at length one day early in 1962, when he was asked about his pay status. Then he was asked whether he would be eligible for hazardous duty pay. Major Petrone responded: "Probably only for appearing before the committee, sir."

KARTH AND SPACE SCIENCE

Hanging in Joe Karth's office was a letter to attest that he had once outdriven Arnold Palmer in a golf match. Aside from consistently winning the annual congressional golf tournament, Karth, a square-jawed, brawny, no-nonsense legislator with a firm handshake and clear-eyed gaze, was the workhorse of the Science and Astronautics Committee. A charter member of the committee, by early 1961 he was chairing a subcommittee in his sophomore term, participating in conference committees, and quickly making his mark as a tough, hard-nosed inquisitor.

In 1958, when Minnesota's Eugene McCarthy went to the U.S. Senate, Democrat Joe Karth captured McCarthy's St. Paul seat in the House of Representatives. A union organizer, he had studied engineering two years at the University of Nebraska. His backers wanted him

to be on the Education and Labor Committee, but there simply weren't enough vacancies in 1959. He pitched into his Science Committee work with a vengeance, won the respect of his colleagues on the committee and in Congress as a man who did his homework, and exercised great influence over the unmanned side of the space program. Karth served as chairman of the Subcommittee on Space Science and Applications until he left the committee to join the Ways and Means Committee on October 6, 1971.

As Teague put it, "Manned space flight got all the credit and all the publicity, and the hardest working subcommittee was Joe Karth's and he got no publicity." Karth and his subcommittee were sort of like the battered and begrimed gridiron linemen who rarely were recognized, while Teague and his glamorous crew in the backfield got all the headlines and the glory of manned space flight.

The Karth subcommittee's investigation of the Centaur program in 1962 marked the first critical, independent analysis of NASA's management problems with private contractors. It was a healthy demonstration of legislative oversight, and revealed the committee at its best in probing and recommending how NASA could improve its administrative performance.

Centaur was a second-stage rocket, fueled by liquid hydrogen and liquid oxygen, and mounted on top of an Atlas missile. In the mid-1960's, Centaur was important as an intermediate link between the smaller Atlas-Agena class and the Saturn vehicles still being developed. The Centaur was needed for NASA's Ranger and Surveyor hard and soft instrumented landings on the Moon, as well as for the Defense Department's communications satellite program. Furthermore, its success was essential to provide the needed experience in handling and storing liquid hydrogen fuels for many other vehicles. The Karth subcommittee investigation revealed that inadequate supervision and quality control by NASA had been factors in the many delays. The committee report concluded that "Putting out fires is no substitute for effective program management. The subcommittee is forced to conclude that management of the Centaur development program has been weak and ineffective both at NASA headquarters and in the field, and that the program has suffered from a diffusion of authority and responsibility."

In its final report, the Karth subcommittee recommended that "NASA should exercise close, continuing, and centralized supervision and direction over the Centaur development program. This should result in a coordinated program in which contractors and subcontractors are required to exercise high-level quality control."

One of the results of the Karth subcommittee's investigation of Centaur was to transfer the responsibility for Centaur out of the

Marshall Space Flight Center. Down at Huntsville, the von Braun team had been concentrating its single-minded effort toward Project Apollo and the development of Saturn. It was evident that insufficient technical and managerial talent was being devoted to Centaur, as proven by the Karth subcommittee investigation. Accordingly, once the Karth subcommittee had made its recommendations, the management and supervision of the Centaur program were transferred from Huntsville and placed under the Lewis Research Center.

The Karth subcommittee hearings and report on Centaur were tough in their criticisms. Yet the effect was good. As Karth reported to his colleagues in executive session: "I had people from NASA come up to me after the hearings had been concluded and say 'We think this is one of the best things that has ever happened.' "

In addition to the Centaur investigation, the Karth subcommittee also held hearings on and issued a useful report on Project Anna, a geodetic satellite operated by the Department of Defense. Dr. Fred L. Whipple had recommended to the committee's Panel on Science and Technology that it did not make sense to classify Project Anna. Acting with remarkable and more than coincidental speed, the Department of Defense suddenly declassified Project Anna after the hearings were announced but just before they got under way. This was perhaps the greatest example in legislative history of anticipatory oversight.

The Karth subcommittee also exerted its influence over policy in the annual authorization hearings. In 1962, the subcommittee authorized funds for the instrumented lunar programs Ranger and Surveyor, but cut out \$10,400,000 requested for an advanced, unmanned lunar exploration program termed Prospector. The committee reasoned that Ranger and Surveyor could gain all the necessary knowledge required for manned lunar landings and by the time Prospector was scheduled men would already be on the Moon and there was little that Prospector could do that men couldn't do themselves. The committee judgment was confirmed by subsequent events.

Karth's training as a labor negotiator, his exposure to engineering at the University of Nebraska, and his determination to get the facts rather than accept the fluff all made him an excellent subcommittee chairman. He had an imagery of expression which frequently spiced up a protracted hearing as, for example, he characterized the supervision of the Centaur as "Just like that prehistoric animal named brontosaurus who grew faster than his brain, and somebody nibbled off his tail and his defenses were down and despite his size he was gentle as a mouse."

Karth also had a manner of cajoling certain witnesses, and carefully measuring their reactions so he could psychoanalyze where his

committee could justifiably recommend reductions, as noted in the following colloquy:

Mr. KARTH. You tell us where the soft spots are.

Dr. FELLOWS. In my estimation, there are no soft spots. You are proceeding on the assumption that a budget has soft spots.

Mr. KARTH. There is quite a feeling among the Members of Congress that there are some very inflated areas within the budget that could be removed from the budget this year without hurting anybody.

Dr. FELLOWS. My answer to that is simply the removal of funds must of necessity slow down some element.

Mr. KARTH. You know you are going to get cut by the Appropriations Committee. We know this, you know it, and better than that, the Appropriations Committee knows it. * * * We have got to either agree with you totally, or take an arbitrary amount. * * * We would like to look a little more responsibly * * *. If we were somewhat responsible and had some idea of what action we should take which would better indicate our responsibility, it might in fact save you people money. * * * Speaking as a friend of NASA, I just think you guys are heading for a little trouble now and in the future years ahead unless you help this committee which is your helper in the Congress.

As time went on, Karth became tougher in his questions, more challenging in his attitude, and even portrayed open skepticism to elicit reactions from witnesses. "Lengthy meetings such as this committee hearing could tend to make us brainwashed," Karth sternly advised Dr. Homer E. Newell on March 8, 1963, adding: "On occasion, the witness may even feel that we are abusive." A few days later, he warned Dr. Newell "to be completely candid and scrupulously honest," and threatened that "once I think the committee should lose confidence in the judgment or in the veracity of the statements or testimony that is being given, I think, then, just because of the nature of the beast that we do face—I think probably it would be extremely disastrous."

NASA witnesses reasoned that Karth's long background as a labor negotiator made him suspicious of the "initial pitch" which so often reveals labor and management presenting extreme positions. Karth frequently pointed out, as he did one day to Dr. Newell, that "There are few, if any, witnesses who ever appear before this committee in opposition to any one of Dr. Newell's programs * * *. If on occasions we appear to be critical in our pursuit of getting information, or in the manner in which we ask questions, it is only because I feel more often than not we feel frustrated for lack of having the information with which to properly compete with those who are sitting on the other side of the table."

CONSTRUCTION OF FACILITIES

In July 1961, Col. Earl G. Peacock of the U.S. Army Corps of Engineers was detailed to the committee staff. Working primarily with

the Manned Space Flight Subcommittee, he was able to advise the committee during the early hectic days when many decisions had to be made on millions of dollars of construction for the space program. Colonel Peacock assisted in the preparation of an amendment the committee proposed in 1962 to require NASA to utilize the facilities design criteria and construction standards established by the General Services Administration, the U.S. Navy Bureau of Yards and Docks and the Army Corps of Engineers—until such time as NASA established its own standards.

When it was pointed out to Teague that NASA opposed the amendment, Teague remarked to the committee at a May 10, 1962 executive session: "I can see nothing wrong, and it seems to me it is protection for our committee until we know that they have standards. I am not going to permit them to build a palace some place to embarrass all of us."

The committee voted the amendment, NASA appealed to the Senate, and the conference report made the following notation:

The Senate amendment contained language similar to the House provision, but inserted the clause, "to the fullest extent practicable." The managers on the part of the House agreed to this language change, based on information from NASA that a substantial portion of design work had been completed and the more restrictive language of the House bill would require a detailed review of the completed design work, thereby delaying the national space program, unless the flexibility provided by the Senate amendment was accepted.

The loophole driven by the Senate served to give NASA the leeway not to move very fast to develop their own construction standards. Colonel Peacock's tour with the committee ended at the close of 1962, and he was replaced by Lt. Col. Harold A. Gould, already well-known to Chairman Miller and other Members through his able testimony on Army construction projects before the Armed Services and other committees. "He was their talk man," recalled Ducander "so he knew a good number of the committee members casually and some of our Armed Services Committee staff because he was over there a good number of times."

"When I got here, they handed me two large justification books," Gould says. "I didn't know what the space program was all about, and I didn't know what the words were—all those acronyms—and finally after struggling in the office for three weeks with these two books involving \$800 million worth of construction (authorizations), I went to George Miller and I said: 'Mr. Chairman, I don't even know where these places are, and I don't understand these words.' " He felt that only a personal inspection would produce the information the committee needed.



Col. Harold A. Gould (right) with Representative Richard L. Roudebush (Republican of Indiana) and an unidentified person. Colonel Gould was named deputy director of the committee in 1975, and executive director in 1979.

So Colonel Gould went out to visit every NASA center in the United States, and the Guaymas Mercury tracking station in Mexico. He reflects:

When I came back, I knew more about these facilities, about what was in the program, than the witnesses who later testified on the programs at (NASA) headquarters.

Having had long experience with orderly planning methods in force throughout the Department of the Army, being trained to observe and ask the right questions about construction programs, and having the advantage of his field investigations, Gould quickly spotted that NASA construction and design procedures were in quite a mess. There were 16 different facilities offices at the NASA headquarters, each going its own way and each in charge of its own construction. Meanwhile, out at the NASA centers, huge discrepancies were cropping up in the budgeted costs for construction. For example, there were some similar style buildings for which the cost figures were glaringly different. Gould discovered that no installation had a master plan; they had "as built" plans which showed where the buildings were, but lacked future projections. As Gould reported,

It was not unusual for NASA's construction projects to miss the mark by 100 percent in the amount authorized versus the actual cost.

Gould made a number of recommendations which were incorporated in both the statute and the committee report. NASA was instructed in the statute to develop its own "uniform design criteria and construction standards" and in 1963 the House succeeded in beating back the NASA-Senate effort to insert weasel-worded loopholes like "to the fullest extent practicable"—as had been done in the 1962 statute. The committee did not stop there, but continued to ride herd on NASA management until NASA in 1965 finally published its very own "Design Criteria and Construction Standards." Associate Administrator Seamans in his introduction to the 1965 volume gave due credit to the House Committee on Science and Astronautics for having initiated the fight for these home-grown standards. Gould also pointed out to the committee that NASA had two different "pots" hidden in the authorization bill out of which they drew facilities design money: (1) there was a separate overall lump sum for that purpose, and (2) each construction project included some design funds. On his field trips, Gould discovered that NASA's practice was that "someone would make a thumbnail estimate of what a facility would cost and put it in the budget, add a given percentage to design it and a given percentage for contingencies and come to Congress to ask for the money." To correct this haphazard practice,

the committee clamped down by knocking out the multiplicity of design authorizations for all the construction projects, lumping all design money at one point in the authorization, and then forcing NASA through strict oversight to justify and utilize these funds for the real purpose they were intended.

At the end of 1963, Colonel Gould went off for a year's tour of duty at the Army War College. He returned to the committee in 1964 as a uniformed officer, and without shifting gears at all he moved easily into a civilian slot as one of the top staff members of the committee in 1965. As noted above, Gould was later named deputy staff director of the committee, and in 1979 executive director.

In contrast to his early criticisms of NASA, Gould looked back in 1978 on the committee actions to beef up NASA's internal management in the facilities area, and concluded:

I think our actions in the oversight area helped to shape NASA's management. NASA has, for example, now one of the best facilities management organizations in the entire Government, in my opinion.

PATENTS AND INVENTIONS

One of the thorny issues which occupied the committee during its early years was how to treat patents and property rights in inventions. As noted in chapter I, the National Aeronautics and Space Act of 1958 required NASA to obtain ownership of inventions, developed through NASA contracts, unless the Administrator could show that the public interest would best be served by waiving title. In the space program, many companies felt their investments were not being protected if the Government contracted for certain types of work and then took title to company-sponsored inventions.

There was a rumbling of discontent with the 1958 provisions, not only because there had been little public or agency input into their formulation, but also industry, the legal profession, NASA, and other interested parties felt the patent provisions might slow down the space program. Under the chairmanship of Representative Erwin Mitchell (Democrat of Georgia), hearings were held in 1959, with most witnesses urging changes in the 1958 law. The bill produced by the Mitchell subcommittee did not clear all the legislative hurdles, passing the House but not being acted on by the Senate.

When Representative Mitchell left the committee in 1961, Representative Daddario was made chairman of the subcommittee. Chairman Miller rounded up most of the lawyers to serve on Daddario's subcommittee, but since there weren't enough Republican lawyers, Representative Alphonzo Bell (Republican of California), a special

species—a nonlawyer—was drafted to join the group. The Daddario subcommittee recommended that NASA should have more flexibility in determining whether to obtain a royalty-free license on each invention developed in the course of NASA research contracts, or to try to obtain full title. In separate views differing from the majority, Representative William Fitts Ryan (Democrat of New York) advocated continuation of the policy set forth in the 1958 act as the best protector of the public interest.

In practice, NASA interpreted the 1958 act liberally, which quieted many of the fears of aerospace contractors.

Although strongly favoring the Daddario committee recommendations, NASA did confess it was not really having any "major difficulties" with the 1958 Act. So it was not the end of the world for the space program when Congress, despite the favorable committee recommendation, failed to take action in either the House or Senate to implement the report. In fact, the Space Act itself was never changed to reflect the Daddario committee's recommendations.

What makes the Daddario committee recommendations significant, however, is the fact that President Kennedy on October 10, 1963, issued a memorandum on patent policy which paralleled and restated many of the Daddario committee recommendations. The memorandum stipulated that all Federal agencies with work performed under Government contract would normally be guided by the terms of the memorandum. Therefore, even though the extensive labors of the Mitchell and Daddario subcommittees were not actually frozen into statute, they did serve as sounding boards for patent policy and also surfaced in statements of Presidential directive which stood, with only minor subsequent revisions by President Nixon.

In the happy-go-lucky early days of the space program, NASA sent up to Capitol Hill a bill which they insisted was necessary to provide the "flexibility" for emergency construction during periods when the slow congressional funding process might really put a crimp in speedy progress. Thus originated the authority to reprogram R. & D. into construction not to exceed 3 percent. The committee soon discovered that reprogramming was going on at a merry pace, so in the authorization bill passed in 1963, the reprogramming limit was cut down to 2 percent—and subsequently squeezed down to $\frac{1}{2}$ of 1 percent by degrees over the years. Also, the committee had moved to require NASA to give House and Senate committees 30 days' notice before reprogramming would become effective, unless approval were given immediately prior to the expiration of the 30 days. Those actions tightened the reins of oversight available to the committee, enabled the committee to review and assess reprogramming recommendations,

and served notice that oversight meant something more meaningful than overflights.

Still another committee-induced reform rendered committee oversight over NASA more effective. In the early years, NASA preferred to present its funding requests with "Research, development, and operations" lumped together. The committee insisted that to make an intelligent review of funding, NASA should separate out administrative operations from research and development. The committee also insisted on "1-year" authorization instead of allowing a blanket authorization for administrative operations stretching over several years. NASA complied with the committee request in the authorization requests from fiscal year 1965 onward, and this enabled more meaningful congressional action in the interests of economy and efficiency.

Among other oversight actions taken by the committee, started in the early Miller years, was to rescind all unused or excess authorizations after three years' time. So as early as 1963, the Committee on Science and Astronautics was taking some of the first steps in the direction of what in the next decade became popularly known as sunset legislation.

OTHER AREAS OF ACTIVITY

Chairman Brooks was never happy unless he could be doing something, and he was always unhappy if he did not observe his staff doing something. Chairman Miller was much more philosophical, yet he encouraged both the committee and staff to get involved in a wide ranging series of different activities. He was also far more interested than Chairman Brooks in the international aspects of scientific work, and kept closely in touch through travel, speeches, and conferences, with work being done in other countries and the assistance which the United States could give to encourage better exchange of scientific information.

The committee held significant hearings on and issued meaningful reports on the NASA development of weather and communications satellites. However, the committee stopped short of getting involved in areas beyond its jurisdiction over research and development. The committee tippy-toed around the fringes of the raging controversy over the public interest in the new Communications Satellite Corporation.

Following up hearings held by Chairman Brooks, Chairman Miller also held investigative hearings on what research and development was being done in new modes of air, land, and sea transportation—including hydrofoils, monorails, aircars, and vertical takeoff planes. Special hearings and reports were issued on radio and radar

astronomy, international scientific activities, United Nations discussions and negotiations on the peaceful uses of outer space, military astronautics, the Bureau of Standards, the National Science Foundation, qualifications for astronauts, the Soviet space program, and the development of solids for propulsion.

THE END OF THE HONEYMOON

On May 23, 1962, the day after Maj. Robert A. Rushworth flew the X-15 at top speed of 3,477 miles per hour, and the day before Astronaut M. Scott Carpenter orbited the Earth in his Mercury capsule, the House of Representatives passed a \$3.742 billion authorization for NASA by a rollcall vote of 343 to 0. It was the last time that the committee was able to achieve such unanimity on the House floor and among its own members.

Yet harbingers of things to come showed in the acid remarks of that inveterate watchdog of the Federal Treasury, Representative H. R. Gross (Republican of Iowa). After the debate had proceeded for several hours, Gross interrupted to inject the first note of discord into the proceedings:

Mr. Chairman, I hesitate to barge into this mutual admiration meeting that has been going on all afternoon, but there are a couple of questions I would like to ask concerning the bill.

Gross wanted to know why so much money was being spent in the southern states and in California, and whether anybody was watching the high salaries which space contractors were paying their executives. Although Gross wound up voting for the bill—the last time he voted for a NASA authorization—he grumpily suggested:

It would be my hope that if and when we do get to the Moon, we will find a gold mine up there, because we will certainly need it.



Chairman Miller confers with Vice President Lyndon B. Johnson at NASA's Ames Research Center in California.



Representatives Olin E. Teague (Democrat of Texas), left, and Charles A. Mosher (Republican of Ohio) inspect Vehicle Assembly Building at Kennedy Space Center, Fla.



Representative Emilio Q. Daddario (Democrat of Connecticut), left, confers with Dr. Harvey Brooks of Harvard University, who frequently testified before and consulted with the Daddario subcommittee.



Representative Alphonzo Bell (Republican of California), left, who served for several years as ranking minority member of the Daddario subcommittee. At right is Dr. Antonie T. Knoppers, senior vice president of Merck & Co., Inc., who appeared before a committee panel.

CHAPTER V

Science, Research and Development, 1963–69

The year 1963 brought many changes to the Committee on Science and Astronautics. The NASA budget request soared again from \$3.7 billion up to \$5.7 billion, but then for the first time serious opposition was mounted in the Congress against the Moon program as well as the balance of the space budget. Several new Members joined the committee in 1963, including Representative Don Fuqua (Democrat of Florida) and Representative John Wydler (Republican of New York) who 16 years later had risen to become chairman and ranking minority members of the committee. Also in that year Majority Leader, and later Speaker, Carl Albert began the first of four years of service on the committee, modestly accepting a seat on the bottom rung of the seniority ladder. Albert joined the committee at the request of both President Kennedy and Speaker of the House John W. McCormack. "President Kennedy wanted me to go on the committee because he was very interested in his 10-year Moon project," Albert relates. And McCormack, who had been on the committee as Majority Leader, was eager to have Majority Leader Albert continue the tradition. When he became Speaker, Albert also took a strong and active interest in the work of the Science Committee.

The death of President Kennedy and the accession of Vice President Johnson did not have a material effect on the committee's mode of operation or influence, even though it was President Kennedy who dramatically focused national and world attention on the manned lunar landing program. The Apollo program still constituted the biggest chunk of the annual authorization bill with which the committee had to wrestle. President Johnson, as one of the architects of the 1958 NASA legislation, had a paternal interest in both the space program and scientific development in general. In addition to his many visits to space installations and personal encouragement given to the astronauts, President Johnson steadfastly supported the efforts of the Science Committee—at least until the budget squeeze caused by the war in Vietnam.

One of the most significant developments within the committee in 1963 was the establishment of the Subcommittee on Science, Research and Development, chaired by Representative Emilio Q. Daddario (Democrat of Connecticut).



The Subcommittee on Science, Research and Development in 1963, from left: Representative J. Edward Roush (Democrat of Indiana), Representative Emilio Q. Daddario (Democrat of Connecticut), chairman; standing, Philip B. Yeager, subcommittee staff director; and Representative R. Walter Richlman (Republican of New York).



Among committee members active in the mid-1960's were, from left: Representatives Weston E. Vivian (Democrat of Michigan), Gale Schisler (Democrat of Illinois), William R. Anderson (Democrat of Tennessee), Brock Adams (Democrat of Washington), and Lester L. Wolff (Democrat of New York).

At the start of 1963, the following constituted the membership of the full committee:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 J. Edward Roush, Indiana
 Thomas G. Morris, New Mexico
 Bob Casey, Texas
 William J. Randall, Missouri
 John W. Davis, Georgia
 William F. Ryan, New York
 Thomas N. Downing, Virginia
 Joe D. Waggonner, Jr., Louisiana
 Edward J. Patten, New Jersey
 Richard H. Fulton, Tennessee
 Don Fuqua, Florida
 Neil Staebler, Michigan
 Carl Albert, Oklahoma

Republicans

Joseph W. Martin, Jr., Massachusetts
 James G. Fulton, Pennsylvania
 J. Edgar Chenoweth, Colorado
 William K. Van Pelt, Wisconsin
 R. Walter Riehlman, New York
 Charles A. Mosher, Ohio
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Thomas M. Pelly, Washington
 Donald Rumsfeld, Illinois
 James D. Weaver, Pennsylvania
 Edward J. Gurney, Florida
 John W. Wydler, New York

Subcommittee on Manned Space Flight, Olin E. Teague, *Chairman*.

Subcommittee on Space Science and Applications, Joseph E. Karth, *Chairman*.

Subcommittee on Advanced Research and Technology, Ken Hechler, *Chairman*.

Subcommittee on NASA Oversight, Olin E. Teague, *Chairman*.

At the organizational meeting of the committee on February 5, 1963, after the customary introduction of the newly elected members, Chairman Miller stressed one of his favorite themes:

We must expand our operations to give more attention to the National Science Foundation, the National Bureau of Standards, and to other facets of science which are our responsibility, than we have in the past.

In practice, the committee tried to do this in between the most time-consuming job of all—exercising oversight over NASA and holding careful and lengthy authorization hearings every spring.

In 1959, the committee sponsored a resolution empowering the National Science Foundation to produce a status report on scientific manpower and education. Subsequently, the committee actively engaged in efforts to expand the training of more scientists and engineers. The committee also conducted many hearings and issued useful reports in related scientific areas such as weather modification, progress toward the metric system in the United States, dissemination of scientific information, and agency reviews of the National Science Foundation and the National Bureau of Standards.

As noted in chapter II, the Panel on Science and Technology, meeting on the average twice a year, began to assume greater signifi-

cance outside the committee as it served to forge closer ties with the scientific community. The panel began to concentrate on central themes, was well attended by a wide number of invited scientific guests, and received wide attention by the news media.

WHY THE DADDARIO SUBCOMMITTEE WAS FORMED

In 1963, the convergence of several events, and the emergence of just the right congressional personality, sparked the creation of a new and significant subcommittee—the Daddario Subcommittee on Science, Research and Development.

The naming of the subcommittee provided an interesting twist. It was originally planned to call it the "Subcommittee on Scientific Research and Development." Mrs. Eilene Galloway, of the Library of Congress Legislative Reference Service, argued strenuously that a broader charter would result if a comma were placed after the word "Science" in the title. She won her point.

Congress and the Nation were becoming uneasily aware that Federal spending for research and development was rocketing upward. From \$74 million in 1940, the Federal price tag had mounted to \$2 billion in 1953. Many Congressmen, despite the research which went into the development of the atomic bomb in the Manhattan project, were uncomfortable with the doling out of such huge amounts for research.

The chairman of the House Committee on Rules, that crafty manager of the abattoir of liberal legislation, Representative Howard W. Smith (Democrat of Virginia), decided to set up a select committee to investigate where these research dollars were going. Because of the huge increase of Federal research spending from \$2 billion in 1953 to \$12.2 billion in 1963, the Smith resolution gained widespread support editorially, in letters from home, and within the Congress itself. At the same time, the groundswell of popular support caused many committee chairmen to shake in their jurisdictional boots. Chairman Oren Harris of the Interstate and Foreign Commerce Committee, with the huge expenditures for the National Institutes of Health research under his jurisdiction, voiced concern behind the scenes, as did Chairman Miller whose Science and Astronautics Committee had over 25 percent of Federal research spending under its jurisdiction. Chairman Carl Vinson of the House Armed Services Committee took another defensive tack: he set up a special subcommittee for military research.

During early August, there were many huddles among members of the Science Committee. Daddario, Miller, and other senior members of the Committee seriously considered openly opposing the resolution.

Speaker McCormack tapped Representative Carl Elliott (Democrat

of Alabama), a moderate southerner and highly respected in the House, as chairman of the new select committee designed by Representative Smith.

FORMATION OF THE ELLIOTT COMMITTEE

Daddario soon became the major spokesman in favor of creating a new subcommittee of the Science and Astronautics Committee, not only because it was needed, but in the hope that it might, in conjunction with other research subcommittees, head off the rush to set up the Elliott committee. Chairman Miller decided to move, and on August 23, he announced the formation of a nine-member subcommittee to be chaired by Daddario. On September 11, the Elliott resolution came up for a rollcall vote. Miller expressed his faint praise mixed with damns in these words on the House floor:

Investigation into research and development has to begin someplace, and perhaps this is as good a place as any. * * * I am certain the Committee on Science and Astronautics will cooperate with the new committee, but it will protect its own interests and will fight against any duplication of effort in those areas in which the House of Representatives has given it statutory jurisdiction.

The resolution was passed, 336 to 0, because this was a kind of motherhood issue that was difficult to vote against. But it was significant that three powerful subcommittee chairmen of the Science Committee—Teague, Karth, and Daddario—did not vote, and neither did one of the high-ranking Republicans on the new Daddario subcommittee—Representative Charles A. Mosher of Ohio.

Out of this somewhat foggy atmosphere, Daddario emerged as a real leader. Fifth-ranked member of the full committee, Daddario was a charter member of the science and astronautics group. He had already played an active role as an expert in the life sciences, and had won a good reputation as a fair and thorough pilot of the Subcommittee on Patents and Inventions.

"I talked to George Miller and to Tiger," Daddario recalls. "I talked to both of them about the importance of broadening out the committee jurisdiction. They were both very willing to listen (and) as we talked about it, the ordinary course of events built up some requirements about what ought to be done." Daddario was convinced that the time for talk was over, and the time for action was at hand.

The relationship between Miller and Daddario was always very warm and close. They shared mutual interests, socially as well as intellectually. One day, after he became chairman, at an executive session of the committee in room 214-B of the Longworth Building, Miller, as was his custom, was spinning an account of some of his early background and reminiscences. He remarked that his father was Irish and his grandmother was Italian, and then related some of the

early history of the times when Italy was composed of independent city states which eventually evolved into one nation. He wound up his little history lesson with the remark: "And that's how the Italians were born."

Daddario immediately asked for recognition, and proclaimed:

Mr. Chairman, I do not think you should give the wrong impression. Italians are born just like everyone else.

DADDARIO BACKGROUND

The new chairman was just short of 45 years old when he took the reins of the subcommittee. A Massachusetts native, he gained fame at Wesleyan University in Middletown, Conn., where he captained both the football and baseball teams. His senior year he was selected as quarterback on the Little All American Team, and *Sports Illustrated* honored Daddario by naming him to their All-Time Little All American Team. He also played professional football for Providence while earning his law degree at the University of Connecticut.

Assigned to the Office of Strategic Services as a military officer in World War II, Daddario drew the delicate and dangerous assignment of negotiating the surrender of German troops in northern Italy prior to the arrival of the American forces. He also served as a major in Korea during combat. Mayor of Middletown, Conn., municipal judge, practicing attorney in Hartford, he had a richly varied background when elected to the House of Representatives in 1958.

The Committee on Science and Astronautics was an easy choice for Daddario for these reasons:

I had a great interest in matters affecting technology and science because of my own involvement in intelligence activities in World War II and the Korean conflict where the leadership of science and the applications of technology were so important. I thought that this committee offered me a place to participate, a brand new committee, a wide area of jurisdiction, and involvement in development of applications important to science.

Bald-headed and bushy-browed, Daddario always walked with the springy step of an erstwhile athlete. Fluent in Italian and French, he had a catholicity of interests which covered not only his own art collection, but also music, the theater, education, economics and international relations. Philip B. Yeager, who served as Daddario's chief of staff for over 10 years on both the Patents and Science Subcommittees, characterizes him in the following terms:

Mr. Daddario, to use current parlance, is unflappable. * * * He tends to accept people at face value until circumstances dictate otherwise, but his instincts for dis-

tinguishing within a very short time between the genuine and the phony are pronounced. * * * Mr. Daddario never lost a bill on the floor of the House for which he was responsible as manager. No mean trick. * * * Mr. Daddario tends to be a political liberal. He has been a lifelong Democrat. By and large, his leanings have been on the liberal side, yet always leavened with common sense. During his term in the House he worked equally well with conservatives. * * * During my service with Mr. Daddario I found him to have a remarkable memory and almost uncanny ability to keep many balls in the air at the same time without dropping any of them. He is a thoughtful, philosophical man, tough-minded but always willing to listen. There is never any doubt as to who is boss in a situation where Mr. Daddario has been placed in charge.

PHILIP B. YEAGER

Yeager himself had been a very productive staff director for the Manned Space Flight Subcommittee since its organization when Miller became committee chairman, and Teague subcommittee chairman. By the time the new Subcommittee on Science, Research and Development was formed, James E. Wilson had come aboard and was assigned immediately to the Manned Space Flight Subcommittee. This made it easier for Daddario to persuade both Miller and Teague that for his new committee to succeed, it would need Yeager as chief of staff.

It was a fortunate choice, not only because Daddario and Yeager shared a mutual respect, but also because of Yeager's indefatigable energy, facile writing ability, and talent for organization. A graduate of the University of Arizona and George Washington University Law School, Yeager had served as Capitol Hill correspondent for a number of newspapers. One of his freelance articles was noted by the then Representative Kenneth B. Keating, who was serving on the House Select Committee on Astronautics and Space Exploration. Keating asked Yeager to draft a speech for him. Then Yeager also approached House Republican Whip Les Arends of Illinois, who was also a member of the select committee. Yeager was soon hired by the select committee in 1958, and helped draft NASA's organic act which Congress passed that year. Initially, Yeager was by mutual consent the Republican staff member who handled inquiries from Republican Congressmen, as well as serving the entire committee.

Yeager proved a tower of strength, not only to Daddario but also to his successors who chaired the subcommittee and many other members of the full committee where Yeager still serves in 1979, as "dean of the staff," and General Counsel.

Daddario let no grass grow under his feet when he received the new assignment. He called a meeting for his new subcommittee on August 27 and outlined his plans to the charter members:

*Democrats**Republicans*

Emilio Q. Daddario, Connecticut, *Chairman*
 J. Edward Roush, Indiana
 Thomas G. Morris, New Mexico
 John W. Davis, Georgia
 Joe D. Waggoner, Jr., Louisiana
 Edward J. Patten, New Jersey

R. Walter Riehman, New York
 Charles A. Mosher, Ohio
 Alphonzo Bell, California
 James D. Weaver, Pennsylvania

Chairman Miller dropped in on the organizational meeting, to underline his full and personal support of the new venture.

FIRST HEARINGS OF DADDARIO SUBCOMMITTEE

Between October 15 and November 20, 1963, the subcommittee held a series of nine basic hearings whose objectives were defined by Daddario as follows:

First, to review the nature of the country's overall scientific effort, and second, to locate and identify the major problem areas which exist or may soon exist within the science relationship of the Federal Government to industry, the universities, foundations, professional societies, and among Federal agencies.

The leadoff witness was Dr. Frederick Seitz, President of the National Academy of Sciences. Many of the Nation's most prominent scientists testified.

Daddario also asked members of the Panel on Science and Technology to evaluate scientific research and development throughout the country, how to strengthen congressional sources of information, and how to more effectively utilize the Nation's scientific and engineering resources.

The responses were provocative, and helped form the basis for additional hearings and reports by the committee. One response from Dr. G. B. Kistiakowsky, former science adviser to President Eisenhower, struck a responsive chord with the committee:

While I cannot speak officially for the National Academy of Sciences, I feel confident that it would be eager to discharge its obligations under its congressional charter and render assistance to your subcommittee request.

Some of the replies warned against too much emphasis on cost-consciousness, and the need to give more priority to basic research. As Dr. H. Guyford Stever, professor of aeronautical engineering, Massachusetts Institute of Technology, Cambridge, put it:

Basic scientists need time and freedom to think and work if they are to produce. Dr. Lee A. DuBridge, president, California Institute of Technology, Pasadena, warned the committee:

Government funds made available for research purposes in colleges and universities are not at all analogous to purchase orders which the Government may issue for supplies and equipment. These contracts and grants are not for the purchase of services or commodities, but for the stimulation of intellectual endeavor in a chosen scientific field.

Roger Revelle, director, Scripps Institution of Oceanography, University of California, bubbled over with enthusiasm as he reported:

During the past 15 years, Federal policy in support of basic research has been to assist all first-rate scientists to do the research they wanted to do, particularly when this research also involved the teaching of graduate students. This emphasis on excellence and on freedom has produced remarkable results. It is not an exaggeration to say that the flowering of American science since the war is as spectacular an outburst of human creativity, though on a far larger scale, as the outpouring of art and literature in Florence during the days of Lorenzo the Magnificent.

Perhaps the most interesting advice came in this form from Dr. Harold C. Urey, professor of chemistry, University of California:

Outsiders should not try to plan the work, or say what is important. Do you really think that any outside group, congressional committee or otherwise, in 1931, could have told a rather unknown scientist by the name of Harold C. Urey that it was important to work on the discovery of heavy hydrogen? * * * I think it is entirely probable that if outsiders had attempted to direct my research at that time that they would have advised that the work be discontinued as unnecessary.

Many other thoughtful and stimulating replies were received, which were summarized in the committee's first report, "Government and Science—A Statement of Purpose."

Dr. Frederick Seitz, President of the National Academy of Sciences, testified on October 15, 1963 that "if your committee were to ask us to make a study, we would regard the report which emerges as your property to be used as you desire." Accordingly, a contractual agreement was made with the Academy which resulted in several excellent studies, the first of which was "Basic Research and National Goals."

RESEARCH MANAGEMENT ADVISORY PANEL

During its first 6 weeks, the subcommittee also assembled a Research Management Advisory Panel. The central purpose of the panel was to point the way to improve research management and policy control of some of the large and costly applied science research programs. The panel was initially composed of the following members:

James B. Fisk, president of Bell Telephone Laboratories, Inc.
James M. Gavin, chairman of the board, Arthur D. Little, Inc.
Samuel Lenher, vice president, E.I. Du Pont de Nemours & Co.
Wilfred J. McNeil, president, Tax Foundation, Inc.

Don K. Price, dean, John F. Kennedy School of Government, Harvard University.
C. Guy Suits, vice president and director of research, General Electric Co.
Jerome B. Wiesner, president, Massachusetts Institute of Technology.

The Research Management Advisory Panel met with the subcommittee members three or four times a year to discuss issues and procedures involving the relationship between government and science. The panel also aided the subcommittee in identifying and isolating problems requiring priority attention by the Congress. Michael Michaelis of Arthur D. Little, Inc., a research management consultant firm, was retained by the subcommittee as executive director of the Research Management Advisory Panel, commencing in 1964.

By the end of 1963, the Legislative Reference Service of the Library of Congress had published two studies which outlined the aids and tools available for Congress in the area of science and technology, with suggestions on how to strengthen them. The committee itself also published a study on "Scientific-Technical Advice for Congress: Needs and Sources." The committee underlined the rising importance of the subject on which it was focusing by noting that in 1964 total Federal expenditures on research and development had risen to \$14.9 billion—as contrasted to \$12.2 billion when establishment of the committee was first under consideration. This staggering total dwarfed the \$74 million being spent in 1940.

SCIENCE POLICY RESEARCH DIVISION

Largely through the influence of the Daddario subcommittee, the Library of Congress established a Science Policy Research Division in 1964. This new division had one of its closest relationships with the entire Committee on Science and Astronautics, and it also helped strengthen the scientific and technical assistance needed by all Members of Congress.

On November 5, 1963, the Daddario subcommittee assembled most of the regular members of the Panel on Science and Technology for a two-day Government and Science Seminar. Special guests were Dr. Wernher von Braun, Dr. Alan M. Thorndike of the Brookhaven National Laboratory, and Dr. S. Fred Singer, Director of the National Weather Satellite Service. At the opening of the meeting, Daddario mentioned that Representative Riehlman, the ranking Republican on the subcommittee, and the staff "have been meeting with a number of scientists in Government and out in order to chart our course." He added that the hearings were pointing toward trying "to locate and identify the major problem areas which exist or may soon exist within the science relationship of the Federal Government to industry,

the universities, foundations, professional societies, and, indeed, amongst and between its own agencies." Daddario noted:

I am also pleased to say that the chairman of the full committee, Mr. Miller, has given the subcommittee outstanding support. He has not only given us the kind of staff that we need, the type of office help that the staff must depend upon to do its work, but he has participated in many of the meetings and has given us the highest moral support.

In his response, Chairman Miller revealed:

I can assure you that the subcommittee was carefully selected. Each member has demonstrated his interest and sincerity and in many cases has some background for the work. Likewise, the staff of the committee is a good one, and they are the ones on whom we depend greatly.

"GOVERNMENT AND SCIENCE" SEMINAR

The "Government and Science" seminar surfaced enough ideas, suggestions and advice to fill several volumes. After all, what do you expect when some of the most intelligent people in the Nation get together and brain-storm with each other? Certainly few people could claim to have as exacting a managerial job as Wernher von Braun. Yet, with timetables staring him in the face, well over 4,000 employees to supervise, superbusy with putting out fires and appealing for more firefighting equipment in his effort to meet deadlines, he still had time to philosophize:

I would make a request on behalf of our working scientists. They are not magicians, they have no crystal ball. Therefore, they should not be expected to precisely predict the practical benefits of their research. It is no more possible for them to make such a prediction than it is for a historian, a social scientist, or I presume a Member of Congress to predict history.

The seminar erupted into a raging debate over the proper geographical distribution of Federal research funds, which gave Roger Revelle the chance to indicate perhaps one of the reasons for maldistribution:

The difficulty with many sections of the country is that there are Representatives in Congress representing the citizens and the leaders of those communities who have in fact not emphasized the right things.

If we look at some sections of the country, the amount of Federal money spent in those sections is very large, but it is spent for military bases, and it is spent for a great many activities other than education, other than real research or support of science and the support of higher education.

NATIONAL SCIENCE FOUNDATION

A few weeks before Christmas in 1963, Leland Haworth, the Director of the National Science Foundation, received a memorandum

which intrigued him. He was thoroughly acquainted with the Daddario subcommittee, and had testified before it and taken part in the "Government and Science" seminar. Yet like many scientists, despite his position of responsibility, Dr. Haworth related:

I could not bring myself to go and see a Congressman, unless I had something to see him about. I would not take his time just to butter him up, so to speak.

But the memorandum put the shoe on the other foot. "Representative Daddario, Chairman of the Subcommittee on Science, Research and Development, would like to meet with you next Monday or Tuesday for 'up to an hour probably—morning, afternoon, or evening'—to talk over with you some of the subcommittee's plans for the future," the memorandum started off. Most contacts with Capitol Hill, particularly with a committee or subcommittee chairman, were confined to the frosty atmosphere of the formal hearing where you brought a thick, prepared statement which you hoped would not leave too much time for questions. The memorandum went on to say that "with Mr. Daddario would be Representative Riehlman, the ranking minority member, and Philip Yeager, the committee's counsel. They would welcome your bringing anyone you wish, and no preparations or materials would be necessary." Daddario said he wanted to discuss the possibility that the National Science Foundation might prepare a report for the subcommittee on scientific education at the secondary school level, the extent to which the NSF should be involved in the support of research in the social sciences, and the question of future authorization review of the NSF by the committee.

Daddario's initial, informal contact with the National Science Foundation as with the National Academy of Sciences, developed into a pattern which proved very successful. He recognized that stronger and more personal bridges had to be built with the scientific community. The agencies involved were more executive-oriented, and only dealt with Congress at arm's length when the annual appropriation time came up. "I recall that they would have preferred not to deal with Congress," said Daddario with reference to a minority feeling among some scientists and administrators of science policy. Concerning another experience of a meeting at the National Academy of Sciences, Daddario related that there were "a couple of people there who had never met a Member of Congress before."

The subcommittee also operated in a strictly nonpartisan fashion. As with Riehlman, and later with Representatives Bell and Mosher, Daddario went out of his way to make sure they were involved in all the important decisions of the subcommittee. Whenever a new program was being worked out, Daddario exercised great care to be sure it was talked out with the Republican members before any public hear-

ings were held or statements made. As a result, there was a better than average cooperative spirit within the subcommittee.

The informal discussion between the committee and the NSF personnel was long overdue. Chairman Miller felt that "it appeared best not to begin a general review of the Foundation until the incoming group had a chance to get its bearings." Haworth, replacing Alan T. Waterman as Director, was entitled to a honeymoon. So the committee broke him in rather easily by asking the NSF to conduct a series of studies on science education, to show (1) what had happened to science education in the 20th century; (2) where the country stands; and, (3) what should be done in the future to overcome the difficulties. The reports were delivered as follows:

"Science Education in the Schools of the United States," March 1965.

"Higher Education in the Sciences in the United States," August 1965.

"The Junior College and Education in Sciences," June 1967.

GEOGRAPHIC DISTRIBUTION

During 1964, the committee itself produced a series of useful reports on the allocation of Federal research funds and the geographic distribution of Federal R. & D. funds. Geographic distribution was a subject which every Congressman understood; the Congressmen from California and Cambridge, Huntsville and Houston, clamored that their disproportionate shares were only due to the fact that they had created "centers of excellence," and that those suggesting there should be more equitable geographic distribution were only attempting to tear down the centers of excellence and replace them with mediocrity. At the same time, there was a hue and cry from the Middle West, from the Appalachian area, and other underfed sectors whose Congressmen articulated the fact that enhanced employment always followed Federal research dollars.

The discussion of geographic distribution got so hot that the Daddario subcommittee asked the National Science Foundation to produce yet another report on the subject. The NSF reported factually on the geographic trends in Federal research dollars, 1961-64, in a report released to the committee in 1964. The report and preliminary groundwork laid the basis for the committee hearings from May 5 to June 4 on both geographic distribution and the issue of allowable indirect costs in Federal grants.

The committee brought out some of the glaring inequities in the geographic distribution of Federal contracts. One of the recommendations made in its October 1964 report was that "the country should work to raise the level of all our colleges and universities without lessening the support of those strong schools which are recognized as being centers of academic excellence." The committee later was

pleased to note that President Johnson on September 14, 1965, set forth a new policy in a memorandum to the heads of all Federal departments and agencies, stating in part:

Research supported to further agency missions should be administered not only with a view to producing specific results, but also with a view to strengthening academic institutions and increasing the number of institutions capable of performing research of high quality.

The Daddario subcommittee also had a salutary influence in revising the standard procedure for allocating indirect (administrative) costs in awarding Federal research grants and contracts. In its hearings the subcommittee brought out that too many appropriation bills set statutory limits on the ratio of indirect to direct costs of federally sponsored research, and also that the older Bureau of the Budget policy regulations were so inflexible as to hurt both the grantee and the Government's interest. The hearings resulted in the issuance of more flexible regulations on indirect costs by the Bureau of the Budget, as well as having an educative effect in the subsequent appropriation bills.

"BASIC RESEARCH AND NATIONAL GOALS"

In March 1965 the National Academy of Sciences furnished the committee with its comprehensive study of "Basic Research and National Goals." The study was made through a committee-Academy contract—the first such contract with Congress in the 102-year history of the Academy. The committee asked the Academy to furnish a report on two questions:

- (1) What level of Federal support is needed to maintain for the United States a position of leadership through basic research in the advancement of science and technology and their economic, cultural, and military applications?
- (2) What judgment can be reached on the balance of support now being given by the Federal Government to various fields of scientific endeavor, and on adjustments that should be considered, either within existing levels of overall support or under conditions of increased and decreased overall support?

As reported in the magazine *Science* on April 30, 1965, "the vagueness of the questions and their essential unanswerability inspired a fair degree of despair behind the Academy's marble facade. But there were the questions—reasonable ones from the point of view of legislators who must appropriate money—and the Academy accordingly turned to the task of answering them."

The assignment was given to the Academy's Committee on Public Policy, which was headed at that time by Dr. George B. Kistiakowsky (who had been Science Adviser to President Eisenhower). The Committee on Public Policy then set up an ad hoc committee of 15 members, which in turn produced a set of 15 individual

papers rather than attempting to produce a consensus. Yet there was one dominant theme which cropped up time and again in the 315-page report on "Basic Research and National Goals": That the future of basic research in the United States was closely tied to the fortunes of the National Science Foundation, and that increased support for NSF was essential for the future strength of the Nation. The report also emphasized the need for a more stable level of funding for basic research on a more dependable, incremented basis.

The committee experience with the Academy was a healthy one, even if it did not produce the kinds of quick, pat answers which some impatient observers seem to demand to write newspaper stories or answer TV quiz questions. Science magazine, frequently a critic of the committee, editorially observed following the Academy report that one thing favoring a closer relationship between the Academy and the Congress "is the scientists' respect for Representative Emilio Q. Daddario.* * * It is generally agreed that Daddario has been running his subcommittee in a responsible and intelligent fashion, and that the subcommittee is developing into an important channel of communication between the scientific community and the Congress."

THE MOVE TO THE RAYBURN BUILDING

After six years cramped in the small quarters of the inadequate committee room in 214-B of the Longworth Building—where frequently the committee members and agency witnesses outnumbered the spectators by space necessities—a red letter day for the committee occurred on January 26, 1965. It was the first hearing held by the committee in its spacious new basketball-court sized hearing room in 2318 Rayburn Building. It also marked the very first hearing that any committee had held in the newly opened Rayburn Building.

Before the committee moved into its new quarters, a few adjustments had to be made. The Architect of the Capitol laid the plans for the new area on Executive Director Ducander's desk one day. They were laid out to preserve very tight security in the manner of the Joint Committee on Atomic Energy. When these plans were scrapped, it was discovered that the plans had been radically altered in the opposite direction—with four huge rooms allowing no privacy for any individual staff member. So there was much hammering and partitioning before the committee was ready to move into its new location.

To mark the occasion, Chairman Miller and Representative Daddario arranged for a discussion by the committee's Panel on Science and Technology, which marked the sixth meeting of the panel. In opening the two-day meeting on January 26, Chairman Miller stated:

This is the first formal meeting in the Rayburn Building, and I think it is only fitting that Speaker McCormack, who has done so much for this building and this committee, be the first man to preside over a meeting here.

With a cheery smile, Speaker McCormack cracked an out-sized gavel, and brought laughter when he proclaimed in an exaggeratedly authoritative fashion: "The committee will come to order." Speaker McCormack celebrated the occasion very briefly with these words:

It seems to me to be singularly appropriate that the Committee on Science and Astronautics should be the first committee to meet in this magnificent building of public service, named for the late beloved Speaker of the House, the Honorable Sam Rayburn of Texas.

Speaker McCormack also praised Majority Leader Carl Albert, noting that "it was with his support that this committee was established, the first standing committee without precedent to be created by the House since the turn of the century."

Chairman Miller also used the occasion of the first meeting of the new Congress to introduce the new membership of the Committee on Science and Astronautics, which in 1965 included the following:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 J. Edward Roush, Indiana
 Bob Casey, Texas
 John W. Davis, Georgia
 William F. Ryan, New York
 Thomas N. Downing, Virginia
 Joe D. Waggoner, Jr., Louisiana
 Don Fuqua, Florida
 Carl Albert, Oklahoma
 Roy A. Taylor, North Carolina
 George E. Brown, Jr., California
 Walter H. Moeller, Ohio
 William R. Anderson, Tennessee
 Brock Adams, Washington
 Lester L. Wolff, New York
 Weston E. Vivian, Michigan
 Gale Schisler, Illinois

Republicans

Joseph W. Martin, Jr., Massachusetts
 James G. Fulton, Pennsylvania
 Charles A. Mosher, Ohio
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Thomas M. Pelly, Washington
 Donald Rumsfeld, Illinois
 Edward J. Gurney, Florida
 John W. Wydler, New York
 Barber B. Conable, Jr., New York

Subcommittee on Manned Space Flight, Olin E. Teague, *Chairman*.

Subcommittee on Space Science and Applications, Joseph E. Karth, *Chairman*.

Subcommittee on Advanced Research and Technology, Ken Hechler, *Chairman*.

Subcommittee on Science, Research and Development, Emilio Q. Daddario, *Chairman*.

Subcommittee on NASA Oversight, Olin E. Teague, *Chairman*.

At the beginning of 1965, the Subcommittee on Science, Research and Development included the following members:

*Democrats**Republicans*

Emilio Q. Daddario, Connecticut, *Chairman*

Charles A. Mosher, Ohio

J. Edward Roush, Indiana

Alphonzo Bell, California

John W. Davis, Georgia

Barber B. Conable, Jr., New York

Joe D. Waggoner, Jr., Louisiana

George E. Brown, Jr., California

Weston E. Vivian, Michigan

THREE-YEAR REVIEW OF THE NATIONAL SCIENCE FOUNDATION

Congress is forever facing deadlines dictated by the calendar, such as the necessity of completing authorization legislation in time, hopefully, for the appropriation bills to reach the floor and be enacted before the opening of the fiscal year. The scientists who contributed to the National Academy of Sciences study "Basic Research and National Goals" were somewhat appalled that the Science Committee pressed them for an early deadline. In its report, the Academy states:

The National Science Foundation is viewed as playing a decisive role. The National Science Foundation is the sole agency of Government whose purpose is support of science across the board and without regard for immediate practical gains. If there is good basic science ready to be done but which does not as yet command support from some mission-oriented agency, then the National Science Foundation must be equipped to step in, if it chooses, to pick up the tab.

The summary also noted the possibility that contemplated making—

the National Science Foundation a much larger agency than it now is—so large that it can eventually become the "balance wheel", or even the main "umbrella", for the support of basic research—especially in the physical sciences—that is too remote to merit support from the mission-oriented agencies. Such a specific policy with respect to the future growth of the National Science Foundation involves a major political decision by Congress and by the executive branch, as formidable and as far-reaching as its decision has been with respect to expansion of the National Institutes of Health.

The Academy study brought into sharper focus the need for writing a new charter for the National Science Foundation—which the Daddario subcommittee proceeded to do in the next three years. If the Daddario subcommittee had followed the practice of some congressional committees of rushing in, thrusting a sweeping solution at the Congress and the NSF within a self-imposed deadline, and insisting on early action, it is entirely possible that the whole exercise might have been futile.

Theodore Wirths of the National Science Foundation, in a June 5, 1978, letter to Chairman Teague, described the approach of the Daddario subcommittee both on this issue and in general:

Its operating style is in many respects a model for producing good legislation. * * * Entirely in keeping with its interests, the Committee's approach has certain essential elements of good science and good scholarship. Its approach to problems involves research, analysis, recommendations, examination of those materials, presentation of them for general discussion and assessment and then a repetition of this process at least once and sometimes many times. Eventually, the Committee brings forth a recommended legislative package that has been studied with great care, has an intelligent and credible record and is trusted by those involved or interested as a responsible approach.

At the request of the Daddario subcommittee, the Science Policy Research Division of the Library of Congress made a thorough study of the NSF's legislative authority, organization, funding and programs which the committee published in May 1965, as "The National Science Foundation—a General Review of Its First Fifteen Years." After this report was published, Daddario's subcommittee held hearings from June through August of 1965, designed to provide a critical evaluation of the Foundation, its functions and operations as they then existed and in the future.

In an extensive article published by the International Science and Technology magazine, senior editor David Allison sized up the work of the Daddario subcommittee in its hearings and gave it high marks. Concerning the investigation itself, Allison noted that, first, the Congressmen had prepared for it through the National Academy of Sciences and Library of Congress studies. Allison also concluded:

The second distinguishing feature was the subcommittee itself: Daddario and his colleagues, whose questions were often superior to the answers they evoked, and whose responses to those answers often showed a deeper understanding of the place of science in our society than did the responses of some of the committee's witnesses.

The NSF by 1965 was spending \$420 million annually, as contrasted with only \$3.5 million in 1951, its first full year of operation. Director Haworth was a little troubled by the fact that he felt some of the NSF grants might be considered as being applied research. Haworth related in a June 30, 1978 letter to Chairman Teague that he had several discussions with Mim Daddario in Mim's garden after work. "Indeed it was on one such occasion that I first suggested to him and Phil Yeager the idea of including authority for applied research in any bill to modify the National Science Foundation Act." In Haworth's words, it was a suggestion to Daddario that Congress "make the Foundation honest." This was indeed one of the recommendations in the committee

report which was subsequently incorporated into the new legislative charter for the NSF.

On December 30, 1965, the Daddario subcommittee issued its landmark report on "The National Science Foundation Its Present and Future," which formed the basis for the legislation developing a new charter for NSF.

RESEARCH IN SOCIAL SCIENCES

One of the difficult issues in revising the NSF charter was how to broaden NSF's authority to support research and education in the social sciences. When the initial bills to establish the NSF were first debated in the House in 1947, Representative Clarence J. Brown (Republican of Ohio) had declared that support of the social sciences would result in "a lot of short-haired women and long-haired men messing into everybody's personal affairs." Much the same type of opposition was voiced on the House floor in the 1960's. Although Representative Fulton voted for the bill, he spoke against broadening the authority to cover social sciences. Representative Durward Hall (Republican of Missouri) cited several titles of grant studies such as "Food Gathering in a Primitive Society." Representative Mosher in the debate countered:

I very strongly urge that all of us resist the temptation, which so often overcomes reporters, editors—and yes, politicians—to evaluate a piece of scientific research merely on the superficial fact that it might have a curious or silly-sounding title.

Daddario, in presenting the bill to the House on April 12, 1967, pointed out that his committee's hearings and analysis found that the NSF had followed a role which was too passive, which had not kept pace with the demands of society, and which should be dealing more actively with emerging problems faced by industry and society as well as the academic community. He indicated that "the National Science Foundation is presently required to collect and collate data on national scientific technical resources. The bill would have the Foundation analyze and interpret those data as well." Daddario also pointed out that the new charter authorized the NSF to "undertake the support of scientific activities relating to international cooperation on foreign policy." This concept had first been suggested by Dr. Roger Revelle at one of the committee's panel meetings.

The legislation which furnished a new charter for the National Science Foundation clearly shows the initiative of the Science and Astronautics Committee in the making of public policy. In opening the debate in the House on April 12, 1967, Daddario observed:

I do believe it is important we recognize here in the House that the changes which are being offered are changes which emanate and initiate here in the House. The impetus comes from us, and the recommendations are not those which are summarily sent to us by the executive branch. * * * Mr. Chairman, this legislation was born and raised in the House of Representatives. It is my opinion that it represents the ability of the House of Representatives to meet the challenge of adaptation to the present needs of our society.

As a matter of strategy, Daddario and Mosher were concerned with the fact that Representative Ford, who was then minority leader, habitually opposed the extension of annual authorizing power to House committees, as he had when the Science Committee first received authorizing power over NASA. They knew that Ford, as a long-time former member of the Appropriations Committee, felt that this not only diluted the power of the Appropriations Committee but also delayed the passage of appropriations bills. Yet they felt that from the standpoint of effective oversight, it was vital to obtain annual authorizing power over the National Science Foundation.

Several confabs among Chairman Miller, Daddario, Mosher, and Yeager finally concluded that Senator Edward M. Kennedy (Democrat of Massachusetts), who chaired the subcommittee handling the issue on the other side of the Capitol, might be interested in inserting this provision into the Senate bill. Since this was Senator Kennedy's only subcommittee, it was reasoned that Senator Kennedy might welcome the opportunity to have such authorizing authority for his subcommittee. Accordingly, the House bill which passed on April 12, 1967, by a 391-22 vote was silent on the issue of annual authorizations for NSF. As planned, the Senate included the annual authorization amendment, and the House accepted the Senate version without the necessity for a conference committee.

Miller talked with Ford on the House floor about the Senate changes, and persuaded him not to oppose the Senate version. Although Ford did not really like the concept, his public reaction was revealed in the following colloquy:

MR. GERALD R. FORD. Mr. Speaker, would the chairman of the committee at this point in brief terms explain what the Senate amendments do?

MR. MILLER. The Senate amendments are procedural. The only amendment that is important is, this will set up authorization for the National Science Foundation and will give to the Committee on Science and Astronautics the right to review annual requests for authorization legislation, something which the committee long felt should be done—

MR. GERALD R. FORD. May I ask one other question. The annual authorization requirement does, I think give to the legislative committee new responsibility, but with that new responsibility comes the need and necessity for prompt action on the annual program of the agency. Can we have the assurance of the committee that the annual authorization legislation will be handled promptly at the beginning of each session?

Mr. MILLER. I can give that assurance. It will be handled with the greatest of facility we can give it.

After the President signed the bill on July 18, 1968, Daddario, in an address on the House floor, assessed the significance of the achievement. Once again he underlined the fact that it was "a bill conceived in the Congress, shaped by a cooperative and concerned effort of both legislative and executive branches, and approved overwhelmingly by the House and Senate on a bipartisan basis." He noted that the bill had been enacted and signed with little fanfare:

It carried none of the emotional or political fervor to which we have become accustomed while dealing with such trying matters as crime, urban redevelopment, welfare, foreign aid, pollution, gun control, and the like.

Yet Daddario expressed the thought that "without the kind of research and frontier thinking for which the new law provides, it seems unlikely that we will solve the sobering dilemmas—physical or social—which now face us."

He added:

I feel it is important to emphasize that new and fundamental knowledge must be obtained in all fields of science if we are to make any real progress toward a better life for our citizens. In fact, we will require better knowledge and understanding merely to keep our present standard of living from crumbling.

VICE PRESIDENT HUMPHREY'S VISIT

In the course of its history, the Science Committee has dealt closely with Presidents, Vice Presidents, Chief Justices, Governors, and even U.S. Senators on occasion.

Partially in response to the interest generated by the National Academy's report on "Basic Research and National Goals," the seventh meeting of the committee's Panel on Science and Technology dealt with general science policy. The keynote speaker for the first of the two-day sessions on January 25, 1966, was Vice President Hubert H. Humphrey.

The Vice President noted in his introductory remarks the presence of a special guest, Lord Snow, Joint Parliamentary Secretary of the British Ministry of Technology:

I want you to know, Mr. Chairman, how proud all of us are, and in particular how proud is President Johnson, of the work which your committee has performed in the past and now performs today and will in the future. The committee has provided a model of congressional oversight. The word "oversight" is one which is used frequently, Lord Snow, in the parlance of American congressional government, and it is a way of indicating not that you just glance over something, but the way in which you take deep perception into what the Government is doing.



Vice President Hubert H. Humphrey addresses the committee's Panel on Science and Technology, as Congressman Daddario looks on.

The challenge posed by the Vice President was contained in his peroration:

We can either rebuild and make a new world, or destroy the old one, and I suggest that we build on the foundations that we have, but build anew and direct our great knowledge, our great fund of knowledge in science and technology with a spiritual dedication that all of it has but one purpose: the emancipation of mankind from his fear; from his hunger; from his despair; and to imbue him with faith, confidence, optimism, love, and hope. I believe that is what we mean when we put together public policy and science.

STANDARD REFERENCE DATA LEGISLATION

The careful textbooks measure
Let all who build beware
The load, the shock, the pressure
Materials can bear
So, when the buckled girder
Lets down the grinding span
The blame for loss, or murder
Is laid upon the man.

—RUDYARD KIPLING, "Hymn of Breaking Strain."

On July 13, 1966, Chairman Miller introduced H.R. 15638 to provide a comprehensive standard reference data system within the Department of Commerce to be administered by the National Bureau of Standards. The Miller bill was referred to the Daddario subcommittee, which held hearings June 28-30, 1966.

The bill in essence sought to make data of known reliability conveniently available for use by scientists and engineers. The aim was to reduce the time-consuming necessity of searching the available literature and attempting to evaluate data where the searcher might not be expert; for example, measurements describing the properties and ingredients of different types of materials, and the rates of chemical reactions. The bill provided for an integrated, comprehensive system to replace the work being done in a piecemeal, uncoordinated, and less efficient manner by individual members of the scientific and technical community.

The Daddario subcommittee and staff did its usually thorough job of hearing the affected Government agencies and private industry, plus soliciting the opinions of the General Accounting Office, Copyright Office, and a number of individuals and business and professional groups. By the time the legislation was ready for the House, the skids were very well greased, and the bill went through the House of Representatives easily on August 15, 1966. Since the Senate failed to act in

1966, Chairman Miller reintroduced the legislation in 1967 and after the Senate finally acted, the President signed the legislation July 11, 1968.

FIRE RESEARCH AND SAFETY

On March 6, 1967, Chairman Miller introduced H.R. 6637, a bill to authorize the National Bureau of Standards \$10 million for a fire research and safety program. The Daddario subcommittee held hearings on the bill during May and June of 1967. The subcommittee also recommended a National Commission on Fire Prevention and Control which had been suggested by the professional firefighting organizations. The bill cleared the legislative process and was signed by the President on March 1, 1968.

Action during 1972 on several innovative fire research proposals will be dealt with in a subsequent chapter.

APPLIED SCIENCE AND TECHNOLOGICAL PROGRESS

The speed of the work of the Daddario subcommittee and the volume of excellent reports turned out by the committee and its close allies like the National Academy of Sciences sometimes got them far ahead of the scientific community. Witness the letter which came in to Chairman Miller on September 23, 1969, from Dr. Harold Brown, later Secretary of Defense, and at that time president of the California Institute of Technology.

Dr. Brown related that he had read the committee-sponsored report of March 1965, on "Basic Research and National Goals."

I read it at the time and considered it a most useful and provocative study. Recently I had occasion to see it again, and learned that it is no longer in print. I am writing now in the hope that you can look into the possibility of another edition. Dr. Brown, in his 1969 letter, noted that the "questions raised and answers given in this report have become even more relevant and useful since 1965." He added:

Concerns about the intellectual contributions of basic science and about its medium and long-term utility to the material advantage of the United States and of mankind have grown since then. Indeed, we are experiencing an adverse tide of popular and congressional opinion, for a number of reasons. It would help us to have easily available in complete form once again the arguments advanced in the 1965 report; we could use them to educate more people about the specific reasons for governmental support of science.

Dr. Brown went on to describe the number of colleges and universities using the 1965 report as textbooks in science and policy seminars.

Early in 1966, Chairman Daddario negotiated a new contract with the National Academy of Sciences for a follow-on report to deal with

applied science and its relation to the national well-being. Dr. Harvey Brooks, of Harvard University, headed an ad hoc panel of 20 Academy members who undertook the study and it was published in June 1967, under the title of "Applied Science and Technological Progress." The report dealt with the special problems of effective application of the resources of science to advances in technology. The various views dealt with the nature and strategy of applied research, the environment and institutions in which applied research is carried out, and the individual scientist and the role of the Federal Government.

Needless to say, in response to Dr. Brown's letter, the earlier 1965 report was reprinted along with sufficient copies of the 1967 report.

On June 7, 1967, the Science Policy Research Division of the Library of Congress produced, at the Daddario subcommittee's request, a report summarizing science activities during the 89th Congress. The report was so startling in its comprehensiveness that Chairman Daddario states in his letter of transmittal to Chairman Miller:

Science and technology is being latticed into the structure of government and the patterns of everyday life. From the report comes explicit evidence that science, in its broadest terms, is now one of the largest, most powerful, and most important forces with which Congress must deal.

INSTITUTIONAL GRANTS FOR SCIENCE EDUCATION

In 1966 and subsequent years, Chairman Miller introduced legislation to promote the advancement of science and the education of scientists through a national program of institutional grants to colleges and universities. The Education and Public Welfare Division as well as the Science Policy Research Division of the Library of Congress prepared studies on this issue. The Daddario subcommittee held hearings on this legislation in 1968 and 1969, and the full committee favorably reported a Miller-Daddario bill in 1969. But the Committee on Rules declined to clear the bill for debate by the full House of Representatives.

Nevertheless, the discussion, studies, and reports provided good sounding boards for the critical needs in higher education. NSF Director Leland Haworth, in a letter to Chairman Teague on June 30, 1978, commented:

I have always been sorry that this bill did not succeed in passage, both because its provisions were generally good ones and because it would have established permanently a national policy of institutional support for our institutions of higher education. Unfortunately, it came just at a time when support for academic institutions generally and academic science in particular was waning in popularity in the face of other pressing problems. Indeed, it might well be thought of as a casualty of the Vietnam war. I still hope that sometime ideas of this general sort may again be brought forward.

At the start of 1967, the members of the full Committee on Science and Astronautics included the following:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 J. Edward Roush, Indiana
 John W. Davis, Georgia
 William F. Ryan, New York
 Thomas N. Downing, Virginia
 Joe D. Waggoner, Jr., Louisiana
 Don Fuqua, Florida
 George E. Brown, Jr., California
 Lester L. Wolff, New York
 William J. Green, Pennsylvania
 Earle Cabell, Texas
 Jack Brinkley, Georgia
 Bob Eckhardt, Texas
 Robert O. Tiernan, Rhode Island

Republicans

James G. Fulton, Pennsylvania
 Charles A. Mosher, Ohio
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Thomas M. Pelly, Washington
 Donald Rumsfeld, Illinois
 Edward J. Gurney, Florida
 John W. Wydler, New York
 Guy Vander Jagt, Michigan
 Larry Winn, Jr., Kansas
 Jerry L. Pettis, California
 D. E. (Buz) Lukens, Ohio
 John E. Hunt, New Jersey

The members of the Subcommittee on Science, Research and Development at the start of 1967 included:

Democrats

Emilio Q. Daddario, Connecticut,
Chairman
 John W. Davis, Georgia
 Joe D. Waggoner, Jr., Louisiana
 George E. Brown, Jr., California
 William F. Ryan, New York

Republicans

Alphonzo Bell, California
 Charles A. Mosher, Ohio
 Donald Rumsfeld, Illinois
 D. E. (Buz) Lukens, Ohio

At the start of 1969, the members of the full Committee on Science and Astronautics included:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 John W. Davis, Georgia
 Thomas N. Downing, Virginia
 Joe D. Waggonner, Jr., Louisiana
 Don Fuqua, Florida
 George E. Brown, Jr., California
 Earle Cabell, Texas
 Bertram L. Podell, New York
 Wayne N. Aspinall, Colorado
 Roy A. Taylor, North Carolina
 Henry Helstoski, New Jersey
 Mario Biaggi, New York
 James W. Symington, Missouri
 Edward I. Koch, New York

Republicans

James G. Fulton, Pennsylvania
 Charles A. Mosher, Ohio
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Thomas M. Pelly, Washington
 John W. Wydler, New York
 Guy Vander Jagt, Michigan
 Larry Winn, Jr., Kansas
 Jerry L. Pettis, California
 D. E. (Buz) Lukens, Ohio
 Robert Price, Texas
 Lowell P. Weicker, Jr., Connecticut
 Louis Frey, Jr., Florida
 Barry M. Goldwater, Jr., California

The members of the Science, Research and Development Subcommittee at the start of 1969 included:

Democrats

Emilio Q. Daddario, Connecticut,
Chairman
 John W. Davis, Georgia
 Joe D. Waggonner, Jr., Louisiana
 George E. Brown, Jr., California
 Earle Cabell, Texas
 Bertram L. Podell, New York
 James W. Symington, Missouri

Republicans

Alphonzo Bell, California
 Charles A. Mosher, Ohio
 D. E. (Buz) Lukens, Ohio
 Larry Winn, Jr., Kansas
 Jerry L. Pettis, California

POLLUTION ABATEMENT

Representative Mosher frequently remarked during subcommittee discussions that his constituents wondered if we could get a man to the Moon and back, why shouldn't we be able some day to put a man into Lake Erie and bring him back safely?

As early as March 1965, the Daddario subcommittee asked its Research Management Advisory Panel to make a study of the technical capabilities underlying the national effort to control pollution. The Management Panel reported in 1966 on the Federal research and development programs in this area, the scientific basis for pollution policy, and suggested future strategy. Subsequent to the report, 11 days of hearings were held by the subcommittee between July and September 1966.

A subcommittee report entitled "Environmental Pollution, a Challenge to Science and Technology" was then published in 1966. The subcommittee report identified areas of needed research in air and water pollution, and solid waste management. The report attempted to sound a challenge to the scientific and engineering community to work on pollution problems with the same sense of urgency as they had on the space program.

Somehow the challenge fell flat on its face. Neither Lake Erie nor your friendly neighborhood landfill could excite the same interest, or the allocation of 50 cents per week exacted in taxes from every citizen by the Congress for the manned lunar landing.

ENVIRONMENTAL QUALITY

As a follow-on, the Daddario subcommittee, after discussions with the Office of Science and Technology, the National Center for Air Pollution, the Federal Water Pollution Control Agency, and various professional and trade associations, decided to hold further hearings on the scientific aspects of environmental quality. These hearings were held from January through March 1968. Out of these hearings came a very useful report entitled "Managing the Environment," published in 1968, which stressed the crucial role for science and technology in the maintenance of a quality environment.

It was also very evident from the studies which the subcommittee had undertaken that the environmental crisis—like the energy crisis a decade or so later—was being tackled in a fragmented fashion by many different congressional committees and executive agencies. The subcommittee therefore stimulated a joint House-Senate colloquium in an attempt to formulate a national policy on the environment.

It was a super ambitious undertaking. Forty Members of Congress were invited to the colloquium which was held on July 17, 1968. The

meeting was co-chaired by Chairman Miller and Senator Henry M. Jackson, chairman of the Senate Committee on Interior and Insular Affairs. Basic presentations were made by a wide representation of Federal officials plus Laurance S. Rockefeller, chairman of the Citizens Advisory Committee on Recreation and Natural Beauty, and Don K. Price of Harvard University.

The House and Senate committees sponsoring the colloquium jointly published a "Congressional White Paper on a National Policy for the Environment." Included in the white paper was a specific declaration of national environmental policy. Another evidence of the effect of the Science and Astronautics Committee on public policy was the inclusion of elements of the white paper's policy declaration into the Environmental Policy Act of 1969, with the assistance of Senator Jackson, a coauthor of the act.

INTERNATIONAL SCIENCE

The very personal interest of Chairman Miller and Chairman Daddario in the international aspects of science policy drew them to visit a large number of international conferences, as well as to lend encouragement to foreign scientific projects in Europe, Asia, Africa, South America, and Australia. Despite the heavy burden of hearings and reports while Congress was in session, both Miller and Daddario managed to take at least one foreign trip per year and also keep closely in touch with developments and personalities in other countries and on an international scale.

Until the establishment by Chairman Miller of the Subcommittee on International Cooperation in Science and Space, chaired by Representative Don Fuqua of Florida, commencing in 1971, the Daddario subcommittee handled all issues pertaining to international science.

At the request of the Daddario subcommittee, the Science Policy Research Division of the Library of Congress, in conjunction with the Foreign Affairs Division, prepared a report on "The Participation of Federal Agencies in International Scientific Programs" which was published in January of 1967. The report was used extensively by the subcommittee as background information in preparing for the committee's eighth panel on "Government, Science and International Policy," held on January 24-25, 1967, and keynoted by Secretary of State Dean Rusk.

INTERNATIONAL BIOLOGICAL PROGRAM

Dr. Roger Revelle, one of the charter members of the committee's Panel on Science and Technology, was best known as the Director

of the Harvard University Center for Population Studies. A man of tremendous breadth, he could always be counted on to produce stimulating new ideas, and his interests and activities were legion. During the 1960's, he became concerned with and active in measures to help match productivity, population, and human welfare on an international scale through the International Biological Program. It was quite natural that Roger Revelle should have been named Chairman of the U.S. National Committee for the International Biological Program, sponsored in the United States by the National Academy of Sciences and the National Academy of Engineering.

Through Dr. Revelle's influence, the Daddario subcommittee became interested in the International Biological Program. Chairman Miller of the full committee introduced House Concurrent Resolution 273 on March 9, 1967, which expressed the support of Congress for the IBP to—

provide a unique and effective means of meeting the urgent need for increased study and research related to biological productivity and human welfare in a changing world environment.

From May through August of 1967, the Daddario subcommittee held hearings on the Miller resolution. Dr. Revelle sounded the keynote on May 9 with these words:

In our times of unprecedented change, biologists are aware of the rapidly growing ability of their fellow human beings to alter the face of the earth through technology. But they are equally aware that these alterations can bring about far-spreading and often destructive changes in the web of life that is stretched so thinly over the surface of our planet.

In its report critically evaluating the program, the Daddario subcommittee in March of 1968 noted that the functions and operations of the IBP stood on shaky ground, organizationally and financially. Even so, the subcommittee urged that the Nation contribute to the program because of the urgency of improved ecological knowledge and the belief that the organizational structure could be improved. The leadership of the IBP responded to the subcommittee's suggestions, and focused the scope of the program on many of the pressing problems the subcommittee had emphasized. In 1967 and again in 1969, Chairmen Miller and Daddario introduced joint resolutions authorizing the transfer of funds from Federal agencies for the support of the IBP. On October 7, 1970, the President signed the joint resolution which had cleared Congress.

Leland Haworth, Director of the National Science Foundation, noted in a June 30, 1978, letter to Chairman Teague that the Daddario subcommittee hearings on IBP "helped clarify the nature of the pro-

grams, the relationships among the concerned Government agencies, and those between the agencies and the research scientists. The hearings also helped put in proper perspective the sometimes overambitious desires and demands of certain of the program's sponsors."

OTHER INTERNATIONAL ACTIVITIES

The Daddario subcommittee recommended that the ninth meeting of the Panel on Science and Technology concentrate on "Applied Science and World Economy" with attention to themes like the geographical distribution of technical resources and the market mechanism. The panel, keynoted by George D. Woods, president of the International Bank for Reconstruction and Development met on January 23-24, 1968.

In December 1967, after an exchange of correspondence between Chairman Miller and Senator John J. Connolly, leader of the Government in the Canadian Senate, many discussions were held concerning the establishment of a scientific committee in Canada. Chairman Miller then invited the members of the proposed Canadian committee to a joint meeting.

On May 8, 1969, an informal coordinating meeting was held in Washington, D.C., between the Canadian committee and the Daddario subcommittee. The main items of discussion were science policy, budget and planning. This meeting was a prelude to firmer relationships with scientific efforts throughout the Canadian Government in the 1970's.

MANAGEMENT OF FEDERAL SCIENTIFIC ACTIVITIES

In the latter years of the 1960's, as the pressure of military expenditures in Vietnam began to take its toll on the budgets of Federal agencies engaged in scientific activities, the Daddario subcommittee began to assess how Federal resources could be used more effectively. Daddario brought up before the Research Management Advisory Panel in September 1967, the roles of the various Government laboratories and the best possible use, and possible reallocation, of money, manpower and facilities.

Following hearings in March and April 1968, the subcommittee recommended in October 1969, that there be greater interagency use of Federal laboratories.

At the request of the subcommittee, the Science Policy Research Division produced a report on "Centralization of Federal Science Activities" which was the subject of additional hearings from July through October of 1969.

In opening the July hearings, Daddario made an unusually sharp statement concerning the crisis facing Federal science activities and their management in 1969:

The status of American science and technology is in serious question. We have recently witnessed the rejection of the National Science Foundation's growth by the House for the second year in a row. The Department of Defense is challenged by academic dissidents and congressional budget-cutters to get out of all research that is not obviously and immediately applicable to its mission. The National Institutes of Health feel the pressure for tangible results at the expense of continual exploratory research. The new agencies for housing, urban development and transportation are under the gun to produce service now, not research. NASA struggles with its future, and has seen its university sustaining program seriously curtailed. * * *

At the same time, every single important national goal is dependent on better, cheaper, more reliable, and more versatile technology. Population, food supply, environmental quality, transportation, housing, education, defense, communications, medicine—all need an expansion of human knowledge for satisfactory progress.

Daddario emphasized that "we have no preconceived stand in this subcommittee." Nevertheless, it was significant that the subcommittee called as its first witness on July 10, 1969, Dr. Lee A. DuBridge, Science Adviser to the President, Chairman of the President's Science Advisory Committee, and Executive Secretary of the recently created Council on Environmental Quality. Dr. DuBridge, former president of Caltech, had also served for 10 years as a regular member of the Science Committee's Panel on Science and Technology. This prompted Chairman Miller to greet him by noting:

We feel like it is old home week when you are around, because you are, after all, sort of an alumnus of the committee.

In the midst of a very serious and also productive discussion of how to organize the scientific machinery of the Federal Government, Representative Fulton sidled into the committee room. Fulton was, like Chairman Miller, an ex officio member of all subcommittees by reason of his position as ranking Republican on the committee. Daddario could see that Fulton had that sort of glint in his eye which spelled impending trouble. He tried to head off a long and disruptive discourse by introducing Fulton in this fashion:

Mr. Fulton, who is the senior member of the Science and Astronautics Committee on the Republican side, on occasion likes to wander into this subcommittee's meetings. I wouldn't want to foreclose him from taking the opportunity of saying hello to you, Dr. DuBridge.

But it didn't exactly work. Fulton launched into a diatribe against Dr. Franklin A. Long of Cornell, whom President Nixon had asked to head the National Science Foundation and then withdrew the nomination when it became apparent Dr. Long was an opponent of the antiballistic missile program. Daddario used his full bag of diplomatic

and parliamentary tricks to turn Fulton off and get back to the subject. He did it neatly and effectively:

Mr. DADDARIO. Dr. DuBridge, I am always pleased when Mr. Fulton comes to this committee because he livens up the situation. That is very helpful. But in this particular instance, it is completely irrelevant to this morning's discussion.

Mr. FULTON. Oh, this is science we are talking about, Mr. Chairman.

Mr. DADDARIO. Yes; it is.

Mr. FULTON. And you, I believe, were talking about the irrelevancy called politics. And you and I are not politicians here, we are scientists; aren't we?

Mr. DADDARIO. Well, the point was made by Dr. DuBridge during the course of this discussion, in his prepared text, that he would want the National Science Foundation Director to be separate and apart from the political game. We made no comment on it because I believe that is how it is.

Mr. FULTON. I question that.

Mr. DADDARIO. I understand, you already have. But the important point is that it is still irrelevant to the proposition of how science ought to be administered and managed. I have made my feelings clear about the matter—

Mr. FULTON. Yes.

Mr. DADDARIO [continuing]. About which the gentleman from Pennsylvania has injected into this discussion. I don't believe that it either adds or subtracts from the morning's events. I was pleased to have it put out because it did liven things up a bit, even though irrelevant.

The hearings of the Daddario subcommittee continued for ten sessions during July and October 1969. They were part of the comprehensive effort which the Science Committee carried forward during the early 1970's, exerting the leadership required to reestablish a coordinated scientific policy at the White House level. The committee's efforts were climaxed by legislation which was finally approved by President Ford, largely as a result of the initial efforts by the Daddario subcommittee followed by the full Science Committee after 1973.

TECHNOLOGY ASSESSMENT

One of the concepts most closely identified with Congressman Daddario in the public eye is his plea for an "early warning" system for technology, and his vigorous effort to establish an Office of Technology Assessment.

Buried in a subcommittee progress report rather randomly titled "Inquiries, Legislation, Policy Studies Re: Science and Technology—Review and Forecast," the kernels of the concept first surfaced publicly in 1966. The committee report referred to the "dangerous side effects which applied technology is creating, or is likely to create, for all humanity," adding that "these effects apparently are so strong—and quite possibly so dangerous—as to pose a genuine threat to man and his physical, mental, and spiritual environment." The report noted a few illustrations, such as chemicals and the balance of nature in agriculture; the supermobility of people through automobiles, combined

with the use of coal-powered dynamos which provide electrical energy but produce the side effects of air pollution; the technology which has produced water-gulping devices at a time when fresh water supplies are rapidly being depleted—to give only a few examples.

The 1966 report suggested the creation of a Technology Assessment Board to serve the same purpose as "early warning" systems do in a military sense. "We are not thinking of the board's authority in terms of a 'stoplight,' but rather in terms of an 'early warning' signal," concluded the report.

Although the 1966 report was the first time that technology assessment and the early warning concept had been mentioned publicly, the idea had its roots even earlier in subcommittee discussions with representatives of the science community, studies and discussions concerning environmental problems, and a long private conversation with Charles A. Lindbergh. The Lindbergh meeting took place in Daddario's Capitol Hill office under highly unusual circumstances, after many months of delicate negotiations behind the scenes. Lindbergh had adamantly refused to appear in any public session of the committee, but agreed to converse privately with Daddario. Philip B. Yeager of the committee staff, and Edward Wenk of the Library of Congress' Science Policy Research Division joined the meeting at Daddario's invitation. They met secretly in Daddario's office in the Longworth Building. The thrust of Lindbergh's warning was that the Earth was heading for disaster unless the balance between science and ecology were properly adjusted.

As a stimulus for discussion, Daddario and Mosher introduced the first bill for a Technology Assessment Board on March 7, 1967. It was a bill "to provide a method for identifying, assessing, publicizing, and dealing with the implications and effect of applied research and technology."

Using the same pattern of careful assessment of the problem with the aid of professional advice which had been so successfully employed in countless other cases, Daddario convened a seminar on September 21–22, 1967, and also commissioned three studies:

"Technical Information for Congress," a Library of Congress study published in 1969.

"Technology: Processes of Assessment and Choice," a report of the National Academy of Sciences to the Committee on Science and Astronautics, published in 1969.

"A Study of Technology Assessment," report of the National Academy of Engineering to the Committee on Science and Astronautics, published in 1969.

During November and December 1969, the Daddario subcommittee held additional hearings on technology assessment, the upshot of

which was the introduction of the 1970 Daddario-Mosher legislation to create the Office of Technology Assessment, which was eventually enacted in 1972 (see chapter XII).

Daddario summed it all up in his pithy comment that "Congress is becoming aware of the difficulties and dangers which applied science may carry in its genes."

ASSESSMENT OF THE DADDARIO SUBCOMMITTEE, 1963-69

In 1970, "Mim" Daddario answered the call of his party chairman to return to Connecticut and run what proved to be a losing race for the governorship. His departure stimulated an outpouring of statements of regret, not only by his colleagues but by the entire scientific community. Daddario later became Director of the Office of Technology Assessment.

The National Journal of August 22, 1970, quite properly called attention to the fact that "The House Science and Astronautics Subcommittee on Science, Research and Development has become the focal point in Congress for studies and recommendations regarding science policy and organization." The same article referred to Daddario as "the leading congressional expert on science," and quoted one scientist as saying: "If only a few Congressmen had one-tenth of his knowledge * * * there would be much more fundamental planning and response."

Dr. Franklin A. Long, vice president of Cornell University, in a letter to the magazine *Science*, characterized Daddario as "having earned a well-deserved reputation as one of the most honest, concerned, and effective Members of Congress. * * * Daddario, as well as the subcommittee which he chairs, has been a principal channel of communication between Congress and the U.S. scientific community, and his special knowledge and qualities will be greatly missed."

Leland Haworth, Director of the National Science Foundation during much of the period when Daddario chaired the subcommittee, wrote in a June 30, 1978, letter to Chairman Teague:

The establishment of and effective relationships with the Advisory Panel contributed greatly to improved understanding of each other's problems, attitudes and potential contributions to the public weal, as well as resulting in such tangible achievements as the report on Basic Research and National Goals, the usefulness of which extended to all people concerned with the role of science in society. The annual symposia contributed to the development of ideas through the meeting of many first class minds from around the world, while giving key people in the Government an opportunity to observe those minds in action.

Philip Handler, president of the National Academy of Sciences, in a letter to Chairman Teague on July 13, 1978, stated that "as much as any other single institutional entity of Government, your commit-

tee has been a constant driving force behind the very real success of Federal support programs for science." Handler also concluded:

The Committee on Science and Technology and its forerunners, as the only committee with a general jurisdiction in the field of science, provided a much-needed legislative mechanism for reviewing and making judgments affecting scientific and technological programs. Until your committee's establishment, legislative responsibility for scientific programs of the Federal Government were dispersed among many committees, and leadership often depended upon the interest or initiative of individual members. Not only did the creation of your committee provide a formal institutional arrangement for legislative promotion and oversight of science and technology, it also gave to the Nation's scientific and technological community a valuable forum at our national seat of government for interaction with the political process.

On a much lighter note, Handler recalled a plane trip he had taken with Chairman Miller, Daddario, and others en route to visit the Kitt Peak Observatory. Handler recalled that en route to Tucson "George Miller and I discovered that we both knew all the words to 'The Road to Mandalay'— somewhat to the discomfort of others aboard." Handler added:

At Kitt Peak, we gazed at the large white reflecting plate of the McMath solar telescope, only to find the Sun's image entirely obscured by clouds. Mo Udall, local host Congressman, raised his arms over his head, in the presence of the Chief of the local Indian tribe, and said: "May the Great White Father in Washington cause the Sun to appear." And just as he lowered his arms, there was the Sun! Whereupon, startled, he said: "Lyndon, I didn't know you could hear me!"



Kitt Peak National Observatory, southwest of Tucson, Ariz.

Gemini and Apollo

The night before Neil Armstrong, Buzz Aldrin, and Mike Collins blasted off on their trip to the Moon, NASA arranged a large dinner party at the Cocoa Beach, Fla., Country Club. As a prelude to the highly successful Moon flight on July 16, 1969, the dinner was a memorable affair because it brought together once again many of those who had worked for years toward the goal about to be realized. House Majority Leader—later Speaker—Carl Albert recalls the occasion vividly.

NASA Administrator Thomas O. Paine was at the microphone introducing the leading Members of the House and Senate who had played a big part in the program, as well as those NASA officials who could spare some time away from the blockhouse or control room. Warm applause greeted some of the congressional leaders and their wives. Then something very unusual happened, according to Carl Albert. When Tiger Teague came in, Tom Paine raised his voice to proclaim, "And now, Mr. Manned Space himself, the guy who really put this show on the road * * * Tiger Teague!" The crowd went wild with sustained applause. It was basically a tribute by those who worked on Project Apollo, who were expressing their appreciation not only for the unflagging support and leadership given to the program, but for the man himself who had done so much to put Apollo across in Congress and the Nation.

As chairman of the Manned Space Flight Subcommittee, Teague was in a position of leadership where he and his subcommittee could make or break the manned lunar landing program, not only so far as NASA was concerned, but even more important in the rest of the Congress and the Nation.

Dr. Wernher von Braun, who always measured his words carefully when assessing a contemporary, put it this way: "Without 'Tiger' Teague's unwavering support our Apollo astronauts would never have landed on the Moon."

One of Teague's most important achievements as chairman of the Manned Space Flight Subcommittee was his ability to educate other Members of Congress so they would understand and vote for funding the space program. His leadership, strategy, and tactics closely resembled the pattern he had developed as a battalion commander in

combat, when he went out personally to reconnoiter enemy positions and went up and down the frontlines talking with his men prior to issuing combat operations orders.

After finishing Texas A. & M. College in 1932 and being commissioned a reserve second lieutenant in the infantry, Teague assumed a full-time job at the post office in College Station, Tex. During the depression years, he rose to become superintendent of that office until his enlistment as a first lieutenant in the Army on October 5, 1940. With the famous "Cross of Lorraine" 79th Division, Teague went into combat almost immediately after the Normandy invasion in 1944. As a battalion commander, his outfit was engaged in intensive combat in the Normandy hedgerows after landing on Utah Beach. For 120 successive days of bloody fighting, Teague's battalion had no rest, and in the battles across France toward the German border one-third of the battalion was killed and one-third injured. Teague himself was wounded six times, the most serious occurring on December 18, 1944, as he was reconnoitering alone near the Siegfried line. Shrapnel tore his left ankle, and another shell's fragments entered his lower back. Fashioning his own tourniquet from a lace from his right shoe, he crawled back on his own power, but that was the end of combat for Tiger. He then had many operations and two years in Army hospitals.

His war wounds eventually led to the loss of his left leg, in 1977, but before then a special rocker-type shoe enabled Teague to master his disability and also become one of the undisputed paddle-ball champions of the House of Representatives.

While still in McCloskey Army Hospital in Temple, Tex., in 1946, Teague made his decision to run for Congress. Congressman Luther Johnson from the Sixth Congressional District in Texas was named a Federal judge, and a special election was called. "Some of us in the hospital had done a lot of talking about the war and the Government, and I just thought I would try it," Teague said casually, starting toward a legislative career which would span 32 years of service. As one of the most-decorated combat veterans in Congress, Teague was a natural to rise to become Chairman of the Veterans' Affairs Committee. Along the road to the top, he opposed and helped narrowly defeat a giveaway pension bill which would have milked the Treasury for an eventual \$125 billion. From the time he became Veterans' Affairs Committee chairman in 1955 at the age of only 44, he shepherded through Congress over 200 bills which he sponsored, almost all of which went through by crushing majorities.

Stocky and barrel-chested, Teague's wide popularity stems from a variety of sources. He has the knack of going right to the heart of issues without a lot of the palaver which is the bill of fare of some politicians.

Whether fishing, playing gin rummy, or presiding over a committee meeting, Teague is frank and direct. But he can be blunt and sharp, too.

Teague's sense of humor is robust and unforgettable. Early in 1959, Maj. Gen. Bernard A. Schriever, who headed the Air Force Ballistic Missile Command, was briefing the committee in a classified session. Suddenly, Teague lowered his voice and asked in a confidential tone: "May I say one thing in complete secrecy?" A sudden hush fell over the committee room, as several Members leaned forward expectantly. In a dramatically sepulchral voice, Teague announced:

The general went to the same school I went to and graduated one year ahead of me. It is one of the best schools in the country.

Teague has successfully preserved nonpartisanship and bipartisanship on the Science Committee. Thus, when Teague chose Astronaut Jack Swigert as the committee staff director in 1973, Swigert warned him: "Before you hire me you should know that I'm a registered Republican." Teague's immediate response was: "Jack, I don't give a damn but if you ever mention Republican or Democrat in that committee, I'll fire you. You should know that."



Chairman Teague (left) and Neil A. Armstrong, the first man to set foot on the Moon.

Teague's rapport with Republicans as well as Democrats is best evidenced by President Ford's remarks on February 27, 1975, at the unveiling of a portrait of Chairman Teague in the Science Committee hearing room. The President said:

I think you are all familiar with the slogan, "Put a tiger in your tank. * * *" I think America can be mighty grateful that 29 years ago some Texans put a tiger in the House * * *. From what we know of those who dealt with him, words of trust and honor—they were the sort of thing that Tiger believed in and acted on and respected * * *. In my younger days, there was a popular song with the words "Hold that tiger." Ladies and gentlemen, here is one Tiger you will never hold.

The nickname "Tiger" had come naturally to Teague, a 125-pound quarterback on his high school football team at Mena, Ark. Born April 6, 1910, on a wheat farm near Woodward, Okla., he and his family moved fairly early to Arkansas where his father ran lumber camps in the Ozarks. Tiger spent his summer vacations while in high school loading log wagons, driving mule teams, or firing the boilers which powered the saws. He worked his way through Texas A. & M. College, where he studied animal husbandry and for 25 cents an hour fed the college's show calves, shoveled out the stalls, did other odd jobs at the local post office and sold tickets for the Missouri Pacific Railroad.

One observer, commenting on the difference between Chairman Miller and Chairman Teague, mentioned that with George Miller "He liked to discuss so many different things. If you went in and you wanted to get an answer from him, you would often spend 30 or 40 minutes in his pleasantries and his discussions about history or to see his latest gadget or model and listen to him explain all that, and then in two or three minutes you would explain your problem and then you would get your business done. You always got your business done even though it took a long time. Mr. Teague says: 'Come on in, say what you have to say and get out.' And he does it in such a way that you don't mind it at all."

In 1963, NASA's Associate Administrator for Manned Space Flight, Brainerd Holmes, had an internal disagreement with Administrator James E. Webb. Holmes, who was very popular with both the committee and Tiger Teague, was replaced by Dr. George E. Mueller who explains that:

I was aware that Holmes had considerable support in Congress. Anticipating major difficulties working with the committee, I flew to Washington and had my first meeting with Tiger Teague. He didn't pull any punches.

"I don't like what happened to Brainerd Holmes," he said without any preamble, "but I believe in supporting the job, not the man. I don't have any personal opinion about you, but as long as you do the job, I'll support the office. You should know one thing, though. If you double-cross me once, it's your fault. If you double-cross me twice, it's my fault and I never have that problem."

Those few words certainly cleared the air, and from that moment forward, Tiger Teague never wavered in his support for me or for the program. Those early days couldn't have been easy for him, though, because I was proposing some major changes in the way the manned space program was to be run.

Dr. Mueller in 1963 proposed what he termed a "politically explosive" reorganization which would take away the autonomy of NASA's three operating centers at Huntsville, Cape Canaveral, and Houston, being run by three very strong-minded individuals - Wernher von Braun, Kurt Debus, and Robert Gilruth. Mueller suggested to the committee that he proposed to centralize authority and direct the program from above. He relates:

I certainly couldn't predict how Wernher von Braun, Kurt Debus, and Robert Gilruth would react to my reorganization plans, but it would have been naive not to expect strong—and loud—opposition.

When I told the committee what I planned to do, there was a long silence as each Member considered the nasty situation which might develop. Finally, Tiger broke the silence: "If that's what you think you have to do, go to it."

BRIEFING CONGRESS ON THE SPACE PROGRAM

High on Teague's personal priority list was his very strong emphasis on providing other Members of Congress with information on the value and importance of the space program. Not only were Congressmen made aware of the contracts and dollars which were pouring into their districts, but Teague also made sure that Members were briefed on all the up-to-date details on the new plans and projects which affected their areas.

As Dr. Mueller indicated:

The committee perceived that one of its primary functions was to provide Congress with a window into the manned space program. This was no easy task because the program was incredibly complex and involved the cutting edge of technology * * *.

Each year, just before congressional hearings, Teague and his subcommittee would go on a fact finding trip. They would visit the operating centers and major contractors throughout the country. It was a grueling trip, but it enabled Tiger to find out where things stood and what was needed. The effort paid off, too; the committee had outstanding success in influencing Congress to vote for the needed appropriations. The appropriations proved to be reasonable, too. It must be remembered the entire \$26 billion manned space program was performed within the budget originally set in 1961.

Another facet of the education process which Chairman Teague emphasized was to persuade Congressmen who were critical of the space program to visit NASA installations, especially for the exciting manned space flights. One of the sharpest critics of the NASA program was Representative Ben Jensen (Republican of Iowa), a member of the Thomas subcommittee which handled NASA appropriations. Tall, blond-haired, inclined to be sarcastically cynical about almost every

new or expanding Federal program, Jensen was also bitterly anti-Kennedy and therefore even more anti-Apollo. Not long after the John Glenn flight in 1962, Teague persuaded Jensen to come down with him to Cape Canaveral one Sunday night in April 1962. According to Maj. Rocco Petrone, Jensen came in "just absolutely going to tear us apart."

Teague briefed Petrone on how to handle Jensen. "Hey, look, this guy can be rough, can be gruff, can be mean—take it," Teague advised. According to Petrone: "He was going to make sure we didn't say anything mean back to him. He was giving us fatherly advice." Jensen observed a test firing of the first stage of Saturn generating 1.3 million pounds of thrust. He was not only impressed, but also agreed to pose with Teague in front of the gantry, smilingly demonstrating his approval. More important, when the NASA authorization bill was debated on the floor on May 23, 1962, the following colloquy occurred:

Mr. JENSEN. Mr. Chairman, will the gentleman yield?

Mr. TEAGUE of Texas. I am glad to yield to the gentleman.

Mr. JENSEN. I want to commend the gentleman from Texas (Mr. Teague) for the great interest he has taken in this space program. It was my pleasure to be in the gentleman's company at Cape Canaveral a couple of weeks ago when the Saturn was launched.

There, for the first time, I had the pleasure of meeting and visiting with Dr. von Braun and Dr. Debus, two German scientists who are perhaps the greatest authori-



Representative Olin E. Teague (Democrat of Texas) talks with Dr. Kurt H. Debus (right) on one of Chairman Teague's many visits to the John F. Kennedy Space Center, where Dr. Debus served as Director.

ties on missiles and space exploration in the world. Whenever the gentleman from Texas (Mr. Teague) has a day to spare, he is there visiting and getting more information about this great space program. I compliment the gentleman most highly for the great interest he has taken and for the fine presentation he has just made which I am sure is of the greatest importance to the future of our country.

Mr. TEAGUE of Texas. I thank the gentleman.

PERSONNEL OF MANNED SPACE FLIGHT SUBCOMMITTEE

When the Manned Space Flight Subcommittee was first established in early 1962, the following members were assigned:

Democrats

Olin E. Teague, Texas, *Chairman*
Emilio Q. Daddario, Connecticut
Thomas G. Morris, New Mexico
William F. Ryan, New York

Republicans

James G. Fulton, Pennsylvania
R. Walter Riehlman, New York
Richard L. Roudebush, Indiana

After the 1962 elections, the subcommittee was enlarged with the addition of new members, and when the committee was organized early in 1963, the following were assigned to the Manned Space Flight Subcommittee:

Democrats

Olin E. Teague, Texas, *Chairman*
Emilio Q. Daddario, Connecticut
Bob Casey, Texas
Joe D. Waggonner, Jr., Louisiana
Edward J. Patten, New Jersey
Don Fuqua, Florida

Republicans

James G. Fulton, Pennsylvania
R. Walter Riehlman, New York
Richard L. Roudebush, Indiana
Alphonzo Bell, California
Edward J. Gurney, Florida

As the most glamorous, most senior, and most active subcommittee with the biggest budget and the greatest focus for publicity, it was natural that all members of the full committee muscled a little with each other to try and gain assignment to the Manned Space Flight Subcommittee or get transferred from one of the other subcommittees.

1963: THE FIRST YEAR OF STRONG OPPOSITION

Less sophisticated observers, as well as some officials in NASA itself, viewed the role of the Science Committee essentially in terms of a group of laymen who were educated through briefings on technical details; who then voted certain changes—almost always downward—in the budget figures presented to them; and who occasionally expressed opinions on certain priorities. If anything were done too slowly, or in a fashion to cause adverse publicity, or if there were

excessive cost overruns, or public washing of any dirty linen, congressional investigations were warranted.

Almost all observers and critics of the committee's work, including most of the personnel in NASA itself, failed to recognize one of the most important roles of the Science Committee which Teague always stressed: the education of Congress and the country on the value of the space program. This in particular meant the persuasion of a majority in the House of Representatives that the program merited continued support. For several reasons, the role of the Manned Space Flight Subcommittee was crucial. In the first place, every Congressman understood that the objective of a manned lunar landing by the end of the decade, first enunciated by President Kennedy on May 25, 1961, was the top priority of the space program. Second, the Manned Space Flight Subcommittee was assigned the major hunk of the NASA budget—about \$3 billion, or more than half of the entire NASA expenditures. Third, unmanned space science and advanced research, while not directly related to the manned lunar landing, were certainly assisted and spurred along by whatever popular support could be generated by the lunar program.

Aside from the launching visits and direct contacts with the astronauts, which he constantly encouraged for all Congressmen, Teague also began on an informal basis to talk with as many noncommittee members as possible to help forge the majority necessary to win the authorization and appropriations battles. He also deputized his subcommittee members, and other members of the full committee, to undertake as much missionary work as they had time to do.

Selling the space program to Congress was no easy task, and Teague and his subcommittee shouldered the heaviest share of the burden. Up to 1962, this was comparatively easy; the shock of Sputnik and Gagarin's flight had not yet worn off, and John Glenn and the other Mercury astronauts had made the program easy to sell. But in 1963, the first real opposition surfaced in Congress.

Congress in 1963 was reflecting incipient dissent from many groups and areas throughout the country, and this dissent expressed itself in several different ways. A large group of scientists began vocal criticism of the Moon program, advocating reallocation of NASA's resources to the unmanned aspects of space, including more emphasis on instrumented landings on the Moon. Writing in *Science* magazine on April 19, 1963, Philip H. Abelson editorialized:

If a scientist is not among the crewmen, the alternative of exploration by electronic gear becomes exceedingly attractive. The cost of unmanned lunar vehicles is on the order of 1 percent of the cost of the manned variety; unmanned vehicles can be smaller and need not be retained

The mood in the country was gradually changing also. The Bay of Pigs disaster and the Gagarin flight in 1961 shocked the Nation to demand positive action to overtake the Soviets. Somehow, the success of making Russia back down during the Cuban missile crisis in 1962, plus American successes in the Mercury program, had a slightly lulling effect on our gung-ho enthusiasm for a crash program in space. The successful Russian flights by 1963 were viewed with more mature and objective reactions.

House Republican Leader Charles A. Halleck (Republican of Indiana) released a letter of protest from former President Eisenhower, which was printed in the April 2, 1963, Congressional Record and contained this warning:

The space program, in my opinion, is downright spongy. This is an area where we particularly need to demonstrate some common sense. Specifically, I have never believed that a spectacular dash to the Moon, vastly deepening our debt, is worth the added tax burden it will eventually impose upon our citizens. This result should be achieved as a natural outgrowth of demonstrably valuable space operations. But having made this into a crash program, we are unavoidably wasting enormous sums. I suggest that our enthusiasm here be tempered in the interest of fiscal soundness.

The New York Times of June 13, 1963, reported that former President Eisenhower, at a breakfast meeting with Republican Congressmen, had bluntly characterized the projected Moon flight as "nuts."

The very size and steep increases in the NASA budget alarmed many Congressmen. To leap from \$1.7 billion to \$3.8 billion and then to \$5.7 billion over the calendar years from 1961 to 1963 terrified those accustomed to pruning budgets and cutting out waste.

Despite the fact that Teague's subcommittee slashed NASA's manned space flight requests by some \$300 million—close to a 10-percent cut—opposition began to form in preparation for the floor fight over the authorization. Six Republican committee members filed "Additional Views" on the bill, even though they voted for the bill both in committee and on the floor. The six were as follows:

Richard L. Roudebush, Indiana
Thomas M. Pelly, Washington
Donald Rumsfeld, Illinois

James D. Weaver, Pennsylvania
Edward J. Gurney, Florida
John W. Wydler, New York

In their additional views, the six committee members attacked the emphasis on outer space to the exclusion of more stress on the military advantages of "inner space"—between 100 and 500 miles from the Earth. They also opposed NASA facility and training grants, and succeeded in cutting NASA grants to educational institutions from \$55 million down to \$30 million in an amendment on the floor. Further opposition surfaced to the proposed Electronics Research Center.

The fight over these two issues is detailed in the next chapter. Among other items of opposition, the six members also attacked both lack of committee staff and lack of a minority staff. Their additional views pointed out that NASA had the fourth largest budget of any Government agency, "yet the Science and Astronautics Committee, with the task of overseeing the operations of NASA, has but 10 professional staff members, the smallest staff in Congress. * * * This situation constitutes a weakness in the system of checks and balances. Here is an instance where the legislative branch, because of inadequate staff, is unable to keep watch on a huge executive agency."

In pleading for specific staff assigned to minority, the six members noted that "It is absolutely vital that all staff members are reasonably available to all the minority members of the committee. The present staff is overburdened with the result that it is difficult for them to be of assistance to minority Members." Representative James G. Fulton (Republican of Pennsylvania) joined in the plea for a special staff assigned to the minority, a reform which was resisted for many years by the committee majority.

As the leadoff speaker to open the critical debate on the NASA authorization bill, on August 1, 1963, Teague brought models of the Saturn boosters and spacecraft onto the House floor. He refuted the arguments that we were just going to the Moon to collect some rocks and lunar soil. He pointed out:

I do not favor the program because it is a glamorous technological exercise, or simply because it would flatter our vanity to beat the Russians at the space game. There would be no excuse whatsoever for such a frivolous expenditure of the taxpayers' money.

No, Mr. Speaker, I am heartily and completely in favor of this program because it is an essential part—but only one part—of our entire space program.

Because the idea of putting human beings on the Moon is so glamorous, too many people think of it as an entire program in itself. That is wrong. Our goal is to be first in every area of space research, development, and exploration. Our goal is to be the leader in space, just as we always have on land, in the air, and on and under the sea.* * *

There is a further reason why Moon exploration is so important to us. In making the prodigious effort to put a man on the Moon, we are going to have to move forward dramatically in many important fields: science, engineering, industrial development, design, mathematics, biology—the whole spectrum of scientific and technological accomplishment.

Teague also stressed the military aspects of space, and the danger of yielding the mastery of space to the Soviet Union. He then reviewed the practical achievements and benefits which already constituted a spinoff from space spending in the areas of medicine, new fabrics, new metals and alloys, and the whole field of miniaturization as well as the development of computer technology. Commencing in 1960, the Science

Committee published studies of "The Practical Values of Space Exploration" which were frequently updated to reveal productive new spinoffs from the space program.

Chairman Miller next took up the cudgels for the lunar landing program. He compared the pessimism of opponents to the opponents of exploring the land beyond the Mississippi River early in the 19th century. With obvious relish, Miller quoted Daniel Webster:

What do we want with this vast, worthless area, this region of savages and wild beasts, of shifting sands and whirlpools of dust, of cactus and prairie dogs? * * *

I will never vote one cent from the Public Treasury to place the Pacific coast one inch nearer to Boston than it now is.

In supporting the majority of the Science Committee in its 1963 bill, former Speaker Martin again underlined the fact that "it is not a partisan committee. They give equal treatment to all, no matter what party may be involved. The decisions are fair and impartial. The gentleman from California (Mr. Miller) has always been fair and generous, and he is a good leader."

One of Teague's major accomplishments during the 1963 and subsequent congressional debates was to convince his colleagues that as a consistent supporter of the antispending bloc in Congress, he was not about to vote for wasteful expenditures. He also could demonstrate, through the cuts voted by his own subcommittee and the other subcommittees, that the Science Committee was rigorously investigating the NASA budget request and was taking the initiative to make the necessary reductions. Teague's credentials as a conservative on spending were known and respected. The thousands of pages of hearings, visits to NASA and industrial installations, conferences with contractors, and investigative reports bolstered his case. He also won support by taking a middle-of-the-road position between those who felt the committee was embarked on a wild spending spree through a crash program, and those in NASA who professed that the committee was cutting the space program too deeply. Teague won many friends and supporters by this line of argument:

I would like to take a moment to try to dispel several extreme notions that a lot of people have about our man-to-the-Moon program.

One of these notions is founded on the allegation that we are proceeding on a crash basis, that we are thereby spending a lot more money than we otherwise would need to and are greedily consuming the bulk of the Nation's scientific talent in the process.

The other notion is based on the allegation, which we have recently heard from NASA's Administrator, that the amount of money requested for the manned lunar landing is a sacrosanct bare minimum which must be left totally intact if we are not to slip badly in our lunar landing schedules and lose money in the bargain.

In my opinion, neither of these allegations will win any awards for accuracy.

Representative Thomas Pelly (Republican of Washington) took the position, even though he finally voted for the bill, that "a great many thinking people are questioning whether the projected date of landing a man on the Moon could not be delayed to better advantage." Pelly was one of the opposition Congressmen whom Teague persuaded to visit Cape Canaveral, where Rocco Petrone took him in hand. Petrone quickly discovered that Pelly was upset because so much of the space budget was being concentrated in Florida rather than in the northwest or the Seattle area which he represented. So Petrone made sure that Pelly rode up the elevator to the top of the Vehicle Assembly Building, where he could see the huge crane marked "Colby Crane Corp.," and Pelly knew immediately that there was a hometown flavor to it. "Those cranes were built by the Colby Crane Corp., and I happen to know they were built in Seattle," Petrone explained.

Miller and Teague effectively lined up their supporters for the final vote, assisted by some strong statements by freshmen Congressmen. For example, Representative Don Fuqua (Democrat of Florida) painted the challenge of the future in these terms:

Space is the challenge of our time. We stand on the threshold of advancements such as the world has never seen. As Columbus charted new worlds, as the Wright brothers ushered in a new era, so the American people today, united in a gigantic effort, are charting new worlds of scientific advancement.

When the roll was called, the members of the Science Committee all returned to the reservation and voted for the bill. But some powerful opposition reared its head for the first time. The chairman of the Committee on Rules, Representative Howard Smith (Democrat of Virginia) voted no, as did the Republican whip and former member of the select committee which established NASA, Representative Leslie Arends (Republican of Illinois). Nevertheless, the Miller-Teague forces carried the day on August 1, 1963, by a majority of 335-57.

JOINT U.S.-U.S.S.R. EXPEDITION TO THE MOON?

Before the end of 1963, NASA got into some more funding trouble on Capitol Hill as a result of President Kennedy's recommendation, in a September 20, 1963 address to the U.N. General Assembly, that there should be United States-U.S.S.R. cooperation in space. President Kennedy was more specific, advocating the possibility of a "joint expedition to the Moon." The President asked: "Why should the United States and the Soviet Union, in preparing such expeditions, become involved in immense duplications of research, construction and expenditures?"

President Kennedy's statement hurt NASA's support among some of the strongest friends of the space program. In the midst of considering NASA's appropriation, Chairman Albert Thomas (Democrat of Texas) of the Independent Offices Appropriations Subcommittee (which was responsible for the NASA budget) protested to the President on September 21, and Teague followed up on September 23 with a stinging letter to the President. Quoting the President's May 25, 1961, establishment of the lunar landing goal, Teague asked:

In view of your statement to the United Nations supporting the possibility of a joint venture with the Russians to reach the Moon, I am very anxious to know whether or not this national goal is being abandoned or changed.

I was disappointed in the suggestion. I have been a very strong supporter of the space program, believing we can be the first nation to put a man on the Moon and knowing that we must achieve this goal if we are to help establish the fact that space will be used for peaceful purposes. Also, I believe that our national security and the security of the rest of the free world is very dependent upon the success of our space program.

Representative Bob Casey (Democrat of Texas), Representative Thomas Pelly (Republican of Washington), Representative Richard Roudebush (Republican of Indiana), and numerous other members of the Science Committee joined in the clamor of opposition to the President's suggestion. When the President answered Representative Thomas' letter with the thought that cooperation would not slow down the space program, a copy was sent to Teague, who again reacted sharply:

That letter says nothing as far as I'm concerned. * * * I'd just as soon attempt to cooperate with any rattlesnake in Texas.

Teague then fired off a letter to Larry O'Brien, at the White House, who had forwarded to Teague a copy of the President's reply to Thomas:

Larry, I am the chairman of an 11-man-subcommittee which has the responsibility of the authorization for the manned space flight program. In my opinion, ten of the eleven members of that subcommittee support our manned space program almost completely on the basis of national defense and national security. It is my opinion that this year except for the national security aspect, the subcommittee would have cut this budget in half.

I do not believe the President's letter to Albert Thomas is responsive to the last paragraph of my letter. For that reason, I would appreciate a letter which I may distribute to my subcommittee and which may be placed in the subcommittee authorization hearings which will begin again in January.

President Kennedy knew enough not to start or continue a personal feud with the powerful chairman of the Manned Space Flight Subcommittee. To Teague's September 27, 1963, letter to O'Brien, McGeorge Bundy, the President's adviser on foreign policy, responded on October 4:

Larry O'Brien and I have talked with the President about your letter of September 27th, and the President asked me to send you an interim answer to the important question which you raise.

The relation between national security and the space program is very clear and important in the President's judgment, and he is currently engaged in a major review of the relative roles of different agencies, precisely with the programs for next year in mind. I think, therefore, that we can assure you that there will be new expressions of the administration's point of view in good time for your subcommittee authorization hearings in January.

In the midst of all this furor, NASA's appropriation bill came before the House. The atmosphere was ripe for a \$250 million cut below the figure authorized, and when the appropriation process was completed NASA wound up with \$5.1 billion; \$500 million short of its budget request. Also added was a provision that no funds could be used for "expenses of participating in a manned lunar landing to be carried out by the United States and any other country without consent of Congress."

President Kennedy never did get around to answering Teague's letter directly. But he was obviously stung by the charge that he had abandoned the lunar landing goal. Perhaps this is why, in San Antonio, Tex., on November 21, 1963, the day before he was assassinated in Dallas, he reaffirmed his commitment in these words:

Frank O'Connor, the Irish writer, tells in one of his books how, as a boy, he and his friends would make their way across the countryside; and when they came to an orchard wall that seemed too high to climb, too doubtful to try, too difficult to permit their journey to continue, they took off their caps and tossed them over the wall and then they had no choice but to follow them.

My friends, this Nation has tossed its cap over the wall of space and we have no choice but to follow it. Whatever the difficulties, they must be overcome.

VISITOR CENTER AT THE CAPE

When Cape Canaveral began functioning as a launch center in the 1950's the Atlantic Missile Range was controlled by the Air Force. For reasons of security and safety, the Cape was usually under wraps and even the working press had difficulty in covering activities and launches, many of which were classified. In addition to bringing many Members of Congress to the Cape to educate them through the excitement of seeing actual launches and a chance to get a firsthand feel of the complexities of the program, Teague brought many other visitors on numerous occasions. With some maneuvering, it was usually possible to invite a very limited number of guests to view launches at the cramped facilities available. But for millions of Americans whose tax dollars were supporting the space program, it was either a case of sleeping on the nearby beaches or watching television—which could never quite convey the precise size of the monster boosters which progressed in size from Redstone, Atlas, Titan to Saturn.

Teague's conviction was that the more people who could see what was going on, the more they had an opportunity to learn through asking questions, the better understanding of and support for the program would result. In the spirit of the 1958 Space Act, he constantly lobbied for more openness in the space program, and more liberal policies toward admitting the general public to the Cape. On December 16, 1963, the Defense Department bowed to pressure and began to allow motorists to drive through portions of its 17,000-acre reservation. They were only allowed to drive through during a 3-hour period from 9 a.m. until noon on Sundays, and then only along a marked route a mile or so from the launch pads. Nobody was allowed to stop. Photographs? Yes, if you took them from your moving car without stopping. Even with these restrictions, the public response was enthusiastic.

Teague brought up with Webb the whole issue of public access in 1963. Webb countered that this was a Defense Department responsibility, but that NASA would consider the question of public visits when construction was completed at the Merritt Island spaceport. On New Year's Day 1964, Teague had one of his small-scale persuasion tours of Cape Kennedy for Representatives Joseph Karth (Democrat of Minnesota) and Thomas Pelly (Republican of Washington). Shortly after returning to Washington and before the 1964 hearings had gotten underway, Teague decided to formalize his campaign with a lengthy letter to Webb, dated January 10, 1964, which said in part:

I would like to bring up a matter which, it seems to me, is of increasing importance—and that is the problem of permitting visitors to make a tour of the general Cape area and the Space Center. There is no question that the pressures are growing for a more liberal policy in this respect, and to permit the average American to get a glimpse of what is going on at this major center of our space effort. Indeed, it seems to me that the Cape has already become an area of national interest and that if more people were permitted to visit it and see for themselves, our space program might receive much benefit in the way of public support.

I realize that there have been good reasons for the limitations imposed thus far and, also, that a plan to open the Cape to tourists would have to be carefully conceived so as not to disturb operations there or result in danger to visitors. Nevertheless, it seems to me that plans of this nature could be studied, produced, and put into operation. I would like to discuss this matter with officials at the Cape during the forthcoming visit of my subcommittee and I would appreciate your views on the subject and would be grateful for any comments you might have to make prior to that time.

In an extended reply, Webb concurred with Teague's suggestions. He promised that when the Merritt Island launch area became operational, a year hence, tours would be supplemented by written and oral explanations of the work in progress and of our programs.

To follow up the recommendations, the Teague subcommittee recommended in its March 11, 1964, report:

The public interest in the Kennedy Space Center is now of such proportions and of such a nature as to place the Cape almost in the category of a national monument or park. With this in mind, the subcommittee has added \$1 million to be applied to the construction of facilities authorization for the Kennedy Center for fiscal 1965. This amount would provide for the construction of public facilities which NASA must have if it is to make the Cape available to the public in any real sense.

Early in 1965, Dr. George E. Mueller, NASA Associate Administrator for Manned Space Flight, asked the National Park Service to recommend an appropriate visitor program. There were some queasy feelings in NASA (as sometimes happens when an agency or individual does not think up a good idea first themselves), but after several years of shifting from one foot to the other the idea began to take form through designs and advance planning work. While all this was going on, and before the Visitors Center was constructed, an interim program of bus tours was started on July 22, 1966. It just so happened that Chairman Teague was at the Cape that day, and he was delighted to note that despite having to stand in the rain there were 1,500 people who took the tours. Within a few years, the proper facilities were constructed, and the Kennedy Space Center contracted with TWA to operate the Visitors Center.

Starting in 1969, the number of visitors topped 1 million, reached a peak of 1,736,302 in 1972, and has exceeded well over 1 million every year. Teague's determination to prod NASA also had its effect in the establishment of similar visitor facilities at other centers, where they were overwhelmingly successful, and also carried out the spirit of the program "for the benefit of all mankind."

Mueller had these conclusions on the public impact of the visitor program first pushed by Chairman Teague:

Teague and the committee believed in the manned space program and worked tirelessly on its behalf. Recognizing that public support was essential, the committee stressed the importance of the program and sought to make its complexities comprehensible to the public. Tiger would, from time to time, introduce groups of influential private citizens to key figures in the space program. He was convinced that the more people knew about the program and its goals, the more they would support it. This conviction, and the steps he took to put it into action, was a vital element in the total success of our program to place the first man on the Moon.

MANNED SPACE PROGRAM COMES OF AGE

When Chairman Teague opened the hearings of his subcommittee on February 18, 1964, he made a brief and pointed introduction:

Dr. Mueller, it is a pleasure to welcome you and the members of your staff to the hearings on manned space flight.

I believe that this year, above all other years, represents a historic turning point in the program. In your hands rests the task of bringing to final reality objectives which have now reached a sharp focus.

Plans of the past must become the crucial experiments and hardware of today.

I encourage you to use these hearings to maximum advantage to get the program before the committee and the people.

The one-manned Earth orbiting Mercury program had been concluded in 1963. The two-manned Gemini program had slipped a year. But the three-manned Apollo lunar program was progressing nicely, with the first unmanned Saturn I launch on January 29, 1964. For the first time, the United States could claim the ability to orbit a heavier payload than the Russians. (Thinking in appropriations terms, Representative Albert Thomas, who did not customarily commit slips of the tongue, referred to the "payroll" orbited by the Saturn). By 1964, Mueller had taken a firm grasp on a reorganized NASA manned space effort. And President Johnson in his State of the Union and Budget Messages made it clear that he intended to support the goal of a manned lunar landing before the end of the decade.

After its usual round of extensive visits to contractors and field installations, the Manned Space Flight Subcommittee in 1964 recommended only minimal reductions of \$41 million out of a grand total of \$3.541 billion requested. This prompted Daddario to observe how lean the budget actually was, and that "as we have looked at it, there is no question but that further cuts will in fact be expensive. They will cost the country more * * *. There is no doubt in our minds but that cuts at this time will stretch out the program to the point where it will not only be more costly, but perhaps will prevent us from accomplishing our objectives before the end of this decade."

Mosher agreed, pointing out that for the first time witnesses were able to give more concrete answers, thus eliminating some of the guesswork. "In the beginning, we were doing some drastic cutting because every one of us were doubtful as to exactly what they really needed, and today they are giving us the information necessary for us to come to conclusions and I think it is a very healthy and good sign," Mosher reported to the full committee in executive session.

In 1964, the opposition votes on the floor showed an increase, as the House sustained the recommendations of the Science Committee by a vote of 283-73 on March 25. But the committee succeeded in beating back the only two amendments which were offered, further indication of the faith which the House had in the committee's thorough groundwork.

CRITICAL ISSUES COUNCIL

At Cape Kennedy on May 28, 1964, Chairman Teague and members of his subcommittee witnessed the successful firing of a Saturn I two-stage launch vehicle, which boosted into orbit an Apollo "boilerplate"

spacecraft. The roar of the Saturn on blast-off failed to drown out the noise and excitement created by a statement on the same day by the Critical Issues Council, of the Republican Citizens Committee (a group presuming to speak for elements of the Republican Party), calling on the United States to abandon the 1970 goal of a manned lunar landing. One sentence in the declaration particularly infuriated Chairman Teague:

The exploration of our universe is a goal too vast, too hazardous, too costly, and too important to all mankind to be financed and conducted by one country alone, and least of all in an atmosphere of unfriendly competition.

Having just emerged from the bitter fight over a President's suggestion that the United States and the U.S.S.R. undertake a joint lunar landing program, Teague was in no mood to have the issue revived. On the same day as the Saturn shot and the same day of the council's statement, Teague fired off a telegram to Dr. Milton Eisenhower, chairman of the council:

This wire is to invite you and your committee or any member of your committee to appear before the Manned Space Flight Subcommittee of the House Committee on Science and Astronautics and present any evidence which you have which would indicate that our space exploration program is too vast, too hazardous, too costly, and too important to all mankind to be financed by one country alone.

Speaking from Cape Kennedy, Teague blasted the council as "doing a disservice to a very successful American space program." He pointed out that "it is not a crash program, but a very austere program and a program that is making excellent progress." He added that any slowdown in the program would eventually increase its costs to the country.

In his response to Teague's telegram on June 2, 1964, Dr. Eisenhower neatly sidestepped the issue and suggested that President Johnson should convene "leading experts" to reevaluate the program:

When the Critical Issues Council decided to study the space program, two of its members agreed to form a study group with the understanding that they would be free to consult with leading scientists, engineers, and science administrators, regardless of their party affiliations. Most of those who were consulted wished not to be identified publicly. The statement issued by the Council represented a consensus of these specialists.

The members of the Critical Issues Council believe profoundly that the space program should be kept out of partisan politics and a careful reading of its statement will show that it adheres to this view. I believe and am so recommending to him, that President Johnson should bring together leading experts in the field, with no reference to political affiliation of the advisers, and ask these specialists to reevaluate the program, a major portion of which is praised by the Council's statement.

I realize that the responsibility which your committee has in this matter and my hope would be that the judgments of a Presidential advisory group would be presented to your committee in harmony with normal governmental procedures.

After his return from Cape Kennedy, Chairman Teague would not let the matter rest there. On June 10, 1964, he wrote the following letter to Adm. Arleigh A. Burke and other members of the Critical Issues Council:

Recent newspaper articles quoted members of the Critical Issues Council as stating that "our space exploration is too vast, too hazardous, too costly and too important to all mankind to be financed by one country alone." On behalf of the Manned Space Flight Subcommittee, I wish to invite you to appear before that subcommittee and present any evidence which you have that would support this statement.

The subcommittee would be pleased to convene at your convenience to discuss further your views.

In addition to Admiral Burke, Teague's June 10 letter was also sent to James H. Douglas in Chicago, Dr. T. Keith Glennan (the first Administrator of NASA) in Cleveland, Lewis L. Strauss in Washington, and Gen. Lauris Norstad (retired) in New York. There is no record that either Mr. Douglas or Dr. Glennan ever replied formally.

Admiral Burke and General Norstad both called attention to Dr. Eisenhower's June 2 response to Chairman Teague and indicated their agreement with that response. General Norstad added: "I, myself, can claim no particular competence in this field." Lewis Strauss, a former member of the Atomic Energy Commission, deplored the fact that more attention was not being paid to the military aspects of space, and stated: "I believe that the only basis upon which our current large expenditure of funds can be justified is national defense."

Since none of the combatants wanted to come out and fight, Teague had called their hand successfully. But the phrase "too vast, too hazardous, too costly, and too important to all mankind to be financed by one country alone" stuck in Teague's craw for many years after 1964. In fact, as long as Teague was associated with the space program, he never forgot it.

For example, during the floor debate on the NASA authorization bill on May 2, 1968, Teague made this observation:

Mr. Chairman, if the pioneers who settled this country and made it great had been modern-day Republicans, they would never have crossed the Ohio River. The Pacific Ocean would be still an unconfirmed rumor and any attempt to reach the manifest destiny of America could have been a project too vast, too hazardous, too costly, and too important to undertake.

BIPARTISAN SUPPORT FOR MANNED SPACE FLIGHT

Despite the brief scuffle in 1964 with the Critical Issues Council, the work of the Manned Space Flight Subcommittee—and, in fact, the full committee also—remained essentially bipartisan. Even on issues where the Republicans on the committee took the lead, like opposition to the Electronics Research Center, there was also substantial Democratic cooperation.

Throughout his tenure as subcommittee chairman, Teague continued to go out of his way to enlist Republican interest and support, and the Republican members reciprocated by working vigorously toward the committee objectives. In presenting the recommended funding for manned space flight in both 1964 and 1965, Teague told his House colleagues:

This bill * * * is not a partisan bill. The space program was begun in a Republican administration and continued in a Democratic administration. Republicans and Democrats alike have supported it through the years. It is an American program, designed to place our country in its rightful position before the nations of the world.

Nevertheless, there were some issues which troubled Republicans on both the Manned Space Flight Subcommittee as well as the full committee. Throughout the 1960's, Republicans on the committee assumed leadership in agitating for a more adequate staff to arm all Members with the tools necessary to exercise meaningful oversight. Coupled with this request was the recommendation that there should be a staff for the minority members of the committee. The arguments advanced for both of these objectives overlapped somewhat, and were annually repeated in "Additional Views" printed every year in the back of the authorization reports. In the early years, there were many Democrats who both openly and behind the scenes advocated an increase in the size of the staff. As it became apparent that Chairman Miller strongly opposed staff expansion, most of the Democrats quietly abandoned the issue and left it to the Republicans annually to beat their chests in futile anger.

Chairman Miller favored the Daddario Subcommittee on Science, Research and Development not only with high quality permanent staff, but encouraged the use of contracts and outside scientific assistance which did the job needed for the Members. In the case of the Manned Space Flight Subcommittee, Chairman Teague made up for a great deal of the staff shortage through his very active, personalized custom of subcommittee visits to contractors, NASA installations and monthly conferences at the Office of Manned Space Flight in NASA Headquarters.

MINORITY STAFF

As has been noted, Fulton annually brought out in committee executive sessions, in "Additional Views" in committee reports, and during House debates on the authorization bill his opinion that there should be more committee staff, there should be a clearly defined minority staff, and that legislation should establish an "Inspector General" for NASA. Fulton proved to be a man ahead of his times; the committee staff eventually grew in the 1970's, a minority staff was authorized, and a 1978 statute provided for an "Inspector General" for NASA and other Federal agencies. Although former Speaker Martin

remained the ranking Republican on the committee until his defeat in the Massachusetts primary of 1966 and his subsequent retirement, Martin yielded to Fulton on most questions of minority policy. Fulton's abrasive personality and tendency to shoot from the hip exasperated his fellow Republicans, not to mention his Democratic colleagues. Thus the full force of a unified minority bloc was rarely brought to bear on behalf of resolving the staff issue, except in the forum of a committee report.

During the 1960's, younger and more aggressive Republican members like Rumsfeld, Wydler, and Roudebush joined Bell and Mosher to raise a chorus of protests against a lack of minority staff. Fulton, as the senior Republican spokesman, repeatedly badgered Chairman Miller on the issue. When the subject was brought up in public, Miller usually tried to change the subject, displaying either angry irritation or amused tolerance in unpredictable mixtures. Miller and Ducander both had been trained under the tutelage of "Admiral" Carl Vinson, who would never deign to allow a minority staff and decreed that the staff should serve members of both parties equitably.

A combination of factors, including some developments totally outside the committee, finally helped achieve a breakthrough for the Republicans. The Madden-Monroney Joint Committee on the Organization of Congress reported its recommendations for congressional reform on July 18, 1966, including the stipulation that two professional and one clerical staff be assigned to the minority on each standing committee on request. Although the Senate passed the reform recommendations, they remained bottled up in the House Rules Committee until 1970 when the law was finally passed. But even then, with an almost solid Democratic vote, the House acted quickly to repeal the minority staff provisions before they could actually take effect in January 1971. Minority staff was a priority Republican goal. "Effective criticism from the loyal opposition is essential to good government," stated Representative James A. Cleveland (Republican of New Hampshire), in the book *We Propose: A Modern Congress*.

Journalists and political scientists interested in congressional reform began to turn out articles and stir discussions which generally favored the concept of minority staffs. Fulton and his allies became bolder and more frequent in challenging Chairman Miller. Finally, according to Ducander, Miller confided to him:

"I cannot stand that man coming to me and worrying me. Let's give him one goddam minority staff member. * * *" This went right against George Miller's grain. He could not stand to have Fulton on his back any more.

Ducander added:

When you get right down to the nitty gritty, (Fulton) just caused so much goddam trouble that George Miller said: "I cannot stand it." So I called Fulton and

said: "The chairman has approved a staff member." He said: "Who do you recommend?" I said: "I do not know."

Fulton hired Richard E. Beeman on June 1, 1968. Beeman resigned on March 19, 1969, to be succeeded by James A. Rose, Jr., who came aboard June 2, 1969, and remained until August 15, 1970. Not until the arrival of Carl Swartz on February 23, 1971, and Joseph Del Riego in October 1971 did the minority have an organized unit which included more than one professional staff member.

During the 1960's, the following were some of the issues which were raised by Republican members of the committee:

Establishment of an Inspector General for NASA.

Opposition to the Electronics Research Center (discussed in the next chapter).

Increased emphasis on military space development.

Creation of Aerospace Safety Advisory Panel.

Greater emphasis on aeronautics, and the fight against aircraft noise.

Opposition to NASA-controlled tracking ships which would constitute a NASA "Navy."

End duplication of Apollo Applications and Manned Orbiting Laboratory.

Opposition to large nuclear rocket (NERVA).

Opposition to M-1 engine development.

Opposition to rapid increase of NASA training grants.

Strong effort to insure that NASA keep the committee better informed in advance of plans and actions.

VICTORIES IN 1965

At the start of 1965, the Manned Space Flight Subcommittee was reorganized to include the following:

Democrats

Olin E. Teague, Texas, *Chairman*
 Emilio Q. Daddario, Connecticut
 Joe D. Waggoner, Jr., Louisiana
 Don Fuqua, Florida
 Gale Schisler, Illinois
 William J. Green, Pennsylvania
 Earle Cabell, Texas

Republicans

James G. Fulton, Pennsylvania
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Edward J. Gurney, Florida
 Donald Rumsfeld, Illinois

The year 1965 saw one of many victories for the Science Committee members, as they savored the results of their earlier efforts bearing fruit and sustained progress was made toward the lunar landing goal. In contrast to 1964, which had been a year of some frustration, budget slashing, and the long span of inactivity between the last Mercury flight and the first two-manned Gemini flight, 1965 was a banner year.

On February 16, Chairman Miller told his cheering colleagues in the House of Representatives that "this morning the United States took another giant stride in the exploration of space. At 9:37 a.m., a Saturn rocket * * * with its 1,500,000 pounds of thrust, lifted off the launch pad at Cape Kennedy, Fla., on a mission to place in orbit

around the Earth, the Pegasus satellite. This was the eighth launch of the Saturn rocket out of eight attempts, a truly outstanding scientific and engineering accomplishment of the men of the National Aeronautics and Space Administration and, of the many contractors who worked so long and hard to make this event a success." Pegasus was the meteoroid detection satellite, which stayed aloft until 1978.

On March 23, Gus Grissom and John Young completed their successful three-orbital flight of Gemini. This set the stage for the debate on the authorization bill on May 6, 1965, and a spirit of great optimism prevailed.

GEOGRAPHIC DISTRIBUTION OF RESEARCH CONTRACTS

The authorization bill which was passed on May 6, 1965, included an amendment which Representative J. Edward Roush (Democrat of Indiana) had inserted in the committee markup of the bill:

It is the sense of Congress that it is in the national interest that consideration be given to geographical distribution of Federal research funds whenever feasible and that the National Aeronautics and Space Administration should explore ways and means of distributing its research and development funds on a geographic basis whenever feasible and use such other measures as may be practicable toward this end.

The location of NASA installations and the geographic distribution of research contracts were issues which were intensely debated within the committee from the start of the space program. Bobby Baker, in his book *Wheeling and Dealing* alleges that he worked through Senator Robert Kerr (Democrat of Oklahoma) and Vice President Lyndon Johnson to persuade NASA Administrator Webb to intervene on behalf of North American Aviation for the multibillion-dollar Apollo-Saturn contracts, thus enabling Baker to install his Serv-U automatic vending machines in North American plants. No proof of this allegation has ever been forthcoming. But the awarding of large contracts was frequently accompanied by intense argument over whether certain sections of the country were being favored.

Every member of the committee, with varying degrees of success, vigorously represented his own district and State when it came to the awarding of contracts or the funding of programs. Thus it was not unusual to see Miller and Bell active on behalf of some California projects, Mosher raising the flag for Lewis Research Center and Plum Brook, Downing standing up for Langley Research Center, Teague and the Texans plugging for Houston and Dallas, while Fuqua, Gurney, and Frey were interested in pushing everything which happened at Cape Canaveral-Kennedy.

Perhaps the most fascinating story about geography, Congress, and the space program occurred with respect to the location of the Manned Spacecraft Center in Houston. Keith Glennan, NASA's first

Administrator, reported that soon after taking office he had a telephone call from Representative Albert Thomas (Democrat of Texas), chairman of the Independent Offices Appropriations Subcommittee handling NASA's appropriations. Thomas said to Glennan:

Doctor, I just want you to know how grateful I am that you're willing to come down here and take on the duties that you're taking on, and I want to be as helpful as I can. Now, Doctor, you're going to need some more research and development. I just want to tell you that down there in Houston, there's an institution known as Rice.

Glennan said: "Albert, I know Rice very well indeed."

At this point, Thomas mentioned that Rice had a sizable chunk of land, adding:

I know Rice would give this land to the Government as a location for a research development laboratory.

Glennan replied:

But Albert, we don't need any more laboratories. We have all that we need at the moment, and we're building one which was started before I came * * * out at Beltsville.

On subsequent visits to Capitol Hill, Glennan dropped in to see Thomas, and "each time he would bring up this same matter and I would turn it off."

Glennan then reported:

Finally, I had a call from him one day, and I would have to guess this would be in the spring of 1959.

"Doctor, about that research center matter down in Houston."

I said, "Albert, you know, we've been over this several times and I have told you very frankly that I can see no reason for spending money for this and until there's a need—there may be at some point in time—I'm just not going to think about asking for money for a research center. We're going to finish the one that we've started."

(Thomas responded): "Now, Doctor, let's stop all the horseshit. I've got your budget in front of me." I've forgotten the number but I think he said: "There's \$14 million in there for Beltsville."

I said, "Well, you know more about it than I do. I don't remember it in that detail."

(Thomas): "Well, let me tell you, Bud, you won't get a nickel of that unless you put a research center at Houston."

And I had sense enough to react by laughing and saying: "Now, Albert, I think it's about time you and I went out and had a drink."

Well, that ended it, and I never did have any more arguments with him about that.

Now, time passes and I go back to Case in Cleveland and Jim Webb takes over * * *.

So the word was out that there was to be a manned space center someplace, and the Governor of Ohio called me one day and asked me if I would undertake to * * * put together a story nominating Ohio as the site for this center. And I just broke out laughing. I said: "You know, I suppose that there are 25 States doing just this at the present time, and I'll lay you a year's salary that that center is going to Houston."

When Webb succeeded Glennan as NASA Administrator, Thomas enlisted the aid of his old college roommate, George R. Brown, a heavy contributor to Lyndon Johnson's campaigns and a close personal confidant of Johnson. Brown, head of the big Houston engineering-construction firm of Brown & Root, had already been one of the most active consultants for Johnson in the Vice President's mission to prepare a space program prospectus for President Kennedy. On May 23, two days before the President's personal appearance before Congress to announce his Moon decision, Webb wrote Vice President Johnson:

In other discussions with Congressman Thomas, he has made it very clear that he and George Brown were extremely interested in having Rice University make a real contribution to the effort, particularly in view of the fact that some research funds were now being spent at Rice, that the resources of Rice had increased substantially, and that some 3,800 acres of land had been set aside by Rice for an important research installation. On investigation, I find that we are going to have to establish some place where we can do the technology related to the Apollo program, and this should be on the water where the vehicles can ultimately be barged to the launching site. Therefore, we have looked carefully at the situation at Rice, and at the possible locations near the Houston Ship Canal or other accessible waterways in that general area.

Webb went on to say that California, Chicago, and the research triangle in North Carolina ('in which Charlie Jonas as the ranking minority member on Thomas' appropriations subcommittee would have an interest') were other candidates for space installations. Webb wrote Johnson that "I am convinced, and believe you should consider very carefully, that the merit of this program will attract the kind of strong support that will permit the President and you to move the programs on through the Congress with minimum political infighting."

Thus when many States and communities other than Ohio began to burn the midnight oil to put their proposals together, they had no Keith Glennan to break out laughing and bet: "I'll lay you a year's salary that the Center is going to Houston." Not until after President Kennedy's May 25, 1961, decision to go to the Moon was clearance received for budget approval of the funds. On September 19, 1961, Webb confirmed the fact that Houston had been selected in preference to 20 other cities submitting proposals. Glennan's scenario was accurate.

On April 5, 1962, Teague's Manned Space Flight Subcommittee held a public hearing which included a review of the Houston land deal. As Teague pointed out during the hearing, Humble Oil Co. conveyed most of the land to Rice University free of charge, on condition it would be reconveyed to NASA. When NASA found the need for additional acreage, NASA purchased additional land from Rice which had been conveyed through Humble Oil Co.

As will be noted in the next chapter, political considerations also certainly accompanied NASA's decision to build an Electronics Research Center adjoining MIT in Cambridge, Mass.

Other geographical prizes soon surfaced. Mississippi's Senator John Stennis was understandably pleased that a test facility had been established in his State, thus making more inviting his task of approving NASA's appropriations through the subcommittee that he chaired. In 1961, Science Committee Chairman Overton Brooks was upset that the Michoud launch vehicle assembly plant was located near New Orleans (Representative F. Edward Hébert's district) instead of Shreveport, but at least it was located in Louisiana.

The lion's share of contracts went to the coastal States, and as the have-nots began to grumble in the early 1960's, the haves polished up their rhetoric. "This is no WPA program," Chairman Miller frequently commented, pointing out that even if California were well endowed with space installations, his own congressional district was not being benefited. The coastal States pointed to the need for water transportation and argued on the lofty plane of taxpayer and national interest, demeaning those "grubby" Congressmen who would stoop to snatch at "pork."

The case for fairer distribution of NASA's billions did not come out in the open until 1964. It was sparked by hearings held in Daddario's Subcommittee on Science, Research and Development. Representative Roush started his long fight in 1964. At his own expense, he visited the northeastern office of NASA in Boston, and discovered that NASA personnel were being used to go out and assist contractors and universities in that region to formulate proposals leading to NASA contracts. Roush also pointed out that there was a western regional office which served the same purpose on the Pacific coast, and that Florida, Texas, Mississippi, Alabama, and Louisiana were well-represented by NASA installations in those States. He urged that more balanced attention be given to the Middle West.

In an executive session of the committee on March 17, 1964, Chairman Miller castigated Roush with this comment:

I will say, Mr. Roush, I hate to think of NASA and its activity being put on a parochial ground for any one section or sections of the country. * * * My own section of the country has less work in it than the State of Indiana.

In 1965, Roush did a lot of missionary work and lined up enough support in the committee to incorporate his amendment into the authorization bill. The bill with the Roush amendment passed the House of Representatives.

When the conference committee met, NASA officials approached the conferees and urged that the amendment either be deleted or

watered down. As a result, the conference voted to make the amendment read:

It is the sense of Congress that it is in the national interest that consideration be given to geographical distribution of Federal research funds whenever feasible, and that the National Aeronautics and Space Administration should explore ways and means of distributing its research and development funds whenever feasible.

The conference report, largely through Miller's and Teague's influence, slipped in a sentence indicating that the Senate had "modified the House language to avoid the implication that present governmental procurement philosophy, derived as a result of years of experience, will be materially altered by an overriding consideration being given to geographic distribution of Government funds."

In vain did Roush try to protest that his "very gentle, nudging amendment" was not in any way intended to make geographic distribution an "overriding consideration." But Chairman Miller assured Webb that he had little to worry about if he were concerned about the amendment.

Webb himself, in a letter to Science Committee staff member, Frank R. Hammill, Jr., outlined his philosophy on the amendment:

To base the award of contracts on geographical considerations, rather than on competition for all companies regardless of location, would be inconsistent with the statutory procurement authority currently applicable to NASA. Moreover, limiting competition to geographical areas might mean that the company with the best capability for a project of importance would not be awarded a contract because of its location.

It was obvious that NASA quickly put its wagons in a circle, and called on assistance from Capitol Hill whenever the issue of fairer geographic distribution came up. In 1966, when NASA sent up the suggested text of a new authorization bill, the geographic section for some strange reason had been quietly dropped. Although the committee then restored the Roush amendment, in practical fact, given the attitude of NASA and Chairman Miller, it didn't amount to a hill of beans.

PASSAGE OF THE NASA AUTHORIZATION BILL IN 1965

The Manned Space Flight Subcommittee made one of its strongest and most convincing presentations on the House floor in 1965. Representative Alphonzo Bell (Republican of California) went into considerable detail to describe how the Committee over the years had pushed hard toward booster capability and rendezvous capability. Representative Don Fuqua (Democrat of Florida) described the process the committee followed in reaching its recommendations:

We were fully aware of our responsibility to the Nation to economize * * *. During the hearings, we probed the justification for each line item. We were guided by this question: "Is each budget item absolutely justified on its own merits to meet minimum program needs for fiscal year 1966?" We questioned each witness extensively in an attempt to uncover soft areas or unjustified expenses.

One measure of the effectiveness of the presentation was the fact that in 1965 the committee was rewarded by a 389 to 11 majority on the authorization bill.

FUTURE PLANNING

Over four years before Neil Armstrong first set foot on the Moon, Chairman Miller and Subcommittee Chairman Teague became concerned about planning for future programs beyond the lunar landing. Miller delegated the responsibility for planning studies to the Subcommittee on Oversight, headed by Teague. From March through June 1965, Teague dispatched letters to all the NASA centers asking them to set forth their goals for the future. Similar letters were sent to all major aerospace contractors, and the replies poured in throughout 1965 and early 1966. Replies were also solicited from Ed Welsh at the National Aeronautics and Space Council, from the Space Science Board of the National Academy of Sciences, and the Department of Defense.

With well over 400,000 people employed in 20,000 companies throughout the country working on the space program, billions of dollars invested in facilities and equipment, and very expensive and sophisticated hardware and flight systems available, there was a deep interest in what would happen after Apollo. Jim Wilson and the staff of the Oversight Subcommittee held a lengthy brainstorming session with Drs. Seamans, Mueller, and the top NASA brass on September 2, 1965.

When Webb appeared before the Science Committee for authorization hearings early in 1966, he confessed that funding for future planning and post-Apollo programs had been severely slashed by the Bureau of the Budget, reflecting the President's decision "to hold open for another year the major decisions on future programs—decisions on whether to make use of the space operational systems, space know-how, and facilities we have worked so hard to build up or to begin their liquidation." Teague made no secret of his displeasure with Webb's testimony on March 10, 1966:

I daily become more disturbed at the attitude of the executive branch of the Government as to whether they really want an aggressive program like we should be carrying out, and why we should wait another year to make major decisions, I don't understand. To me it is like telling a child that we are going to make you crawl another year before you can walk * * *.

In July 1966 the committee published the results of its future planning studies under the title of "Future National Space Objectives." The most important single recommendation made in the committee report was the opening gun which the committee fired in support of the Space Shuttle:

Immediate planning for a new generation of spacecraft capable of recovery at low cost and which are ground recoverable is a requisite to attaining lower total mission cost.

The report also made the recommendation—

that NASA report to the Congress not later than December 1, 1966, its recommendations on possible major national space objectives; the combination of missions included under such objectives; its expected total and annual cost; the benefits of such a program; and its composition in terms of the combined manned and unmanned building blocks required.

Had NASA taken this report requirement seriously, it is possible that the space program would have fared better budgetwise in the Congress. Instead, the idea was dismissed with a two-page letter dated December 1 with Webb's name typed at the bottom but signed by Seamans for Webb. NASA pleaded inability to formulate detailed future plans for the following reasons:

Because of the difficult budgetary situation resulting from the war in Vietnam and other factors, we are uncertain at this time as to what the President will approve for our fiscal year 1968 budget. Even in the absence of these uncertainties, of course, we would be precluded by the regular budgetary procedures from presenting specific statements on our future plans at this time.

To members of the committee who had been attempting to force NASA to put down its ideas about its future, it seemed almost as though NASA was refusing to admit it had much of a future.

PROGRESS IN 1966

Five highly successful Gemini flights during 1965, and the successful completion of space walks—extravehicular activity—and experience at rendezvous and docking of spacecraft set the stage for another successful year in which the Science Committee won a thumping majority for the NASA bill on the House floor.

Once again Chairman Teague put his subcommittee through a grueling schedule which included the usual round of visits to contractors and NASA installations. There was also a regular monthly visit to the Manned Space Flight Office in NASA Headquarters where George E. Mueller and his staff engaged in very frank, off-the-record sessions with as many committee members as could get away from Capitol Hill.

As an example of the type of interchange between the Manned Space Flight Subcommittee—plus other interested committee members—and George Mueller's staff at the NASA Manned Space Flight Office, the following memorandum excerpts were prepared at NASA:

Subject: Teague review, January 20, 1966.

Attendees: Congressmen Teague, Daddario, Casey, Rumsfeld, Schisler, and Adams.

Congressman Teague asked, Would we break the Apollo schedule (that is, slip the basic program beyond 1970) to have Apollo applications in order to absorb the cuts we are expecting. Answer, No, we owe it to the world and we have to keep these people working. Asked next question, How the program was cut by the Bureau of the Budget and the President. The answer was, A very selective cut rather than general but the Bureau of the Budget made general cuts and the agency had the opportunity to reconstruct its budget to conform to the cuts. He wanted to know what the impact of a severe cut would be, and asked for an analysis of cuts of 2 percent, 5 percent, and 10 percent of the budget [Loenig asked to do this]. [Teague said] Administrative Operations and Construction of Facilities will be covered in the full committee. The subcommittee will hear the research and development. Teague asked about the Russians attempting soft landing on the Moon. Vis-a-vis ours. The main thrust was, Did the Russian failures have any effect on our planning or thinking. Reply, No, it is a difficult problem and we are going as fast as we can and our pace is not influenced by the Russians. Mueller said we will keep the option open 1 more year if we lose Apollo Applications. Teague asked, Did the removal of the suits have any effect. The answer was it improved the general situation in the spacecraft. The astronauts were comfortable. Was the configuration of the suit different, the answer, Yes. Adams asked about the effect of the 5-7 PSI (pounds per square inch) atmosphere, The answer was no effect. Also, the effect of tumble—answer, if it's below 1 revolution per minute, no problem. In order to improve the situation, they covered the window with paper or something else. Daddario, Why did the Agena show up bad late. The reason is we had 185 good ones with plenty ground tests and checkouts. This was really an unexpected failure. Teague, How has your construction at the launch sites been delayed, was this caused by labor. The answer, On 37B we lost 37 days. The spacecraft was the pacing item on 201. Delays also caused by weather or other changes. There was no loss on pad 39 due to labor. Daddario asked if the cut caused a stretchout, will it cost more? The answer, It was no cut to basic Apollo, only the follow-on program. Daddario, Is the MOL (Manned Orbiting Laboratory) another Apollo. Answer, No, MOL is designed for DOD missions only. Crawler question was raised by Daddario, by asking has it moved anything, and the answer was, Yes, the LUT (Launch Umbilical Tower). Did we pay for the changes? Daddario asked, and then Teague became quite upset over the fact that we allegedly bail the big companies out and let the little companies go bankrupt.

The meetings with George Mueller and his staff were helpful, off-the-record opportunities for both groups to let their hair down, get to know each other better, and to get frank answers to questions and issues concerning the subcommittee.

As 1966 wore on, Teague began to worry about the pressures which Vietnam and the poverty program placed on the funds necessary to achieve the lunar landing goal. He remarked during the NASA authorization debate on the House floor on May 3, 1966:

The war in Vietnam has already forced a substantial reduction in the NASA budget for the coming fiscal year. Fortunately, however, thanks to our abundance of resources, it has not yet forced us to abandon our goals and our national requirements in space.

And Teague had reason to be concerned. The budget for NASA had already passed its peak, and it was touch and go whether the spending plateau could be maintained high enough to enable a successful Moon landing by the end of the decade. On August 17, 1966, Astronaut Lt. Col. Edward H. White wrote Teague from Houston to tell him that "We are coming along rather well in our preparations for the first manned Apollo flight and should be shipping our spacecraft to the Cape next week. If all goes well, which it usually doesn't on the first flight, we shall be ready for launch in about 100 working days after the spacecraft reaches the Cape. * * * I hope that your schedule will permit you to attend our launch as you did for the flight of Gemini IV. I would like you to feel that you have a personal invitation from the crew. Enclosed is a picture from the first Apollo crew."

Teague responded August 26, 1966:

DEAR ED: Thank you so very much for your letter of August 17 and the wonderful picture of you, Gus Grissom, and Roger Chaffee. I certainly expect to be at Cape Kennedy for your launch and appreciate your invitation.

At the moment, Ed, I am very depressed over our space program—more so than at any time since I have been working on it. There are so many things happening which indicate that the administration will make a serious cut in money this next year. To me it would be a great shame if we do not complete our space program because of money and not because of technology. It seems that billions have to go into the poverty program. It is my personal belief that the space program and the poverty program could be tied together very well. * * *

Only a few months later, tragedy struck on pad 34 at Cape Kennedy.

"FIRE IN THE COCKPIT!"

On February 18, 1960, when the Science Committee was in its infancy, Dr. Abe Silverstein, NASA's Director of Space Flight programs, was testifying before Chairman Teague's subcommittee on the subject of the first planned Mercury suborbital flight. After listening for awhile to the engineering complexities which were involved, Teague suddenly observed:

I am one who wants that first flight to be a successful flight, and I don't care how long we wait to do it.

From the start, the priority of the Manned Space Flight Subcommittee was always placed on human safety. Yet there was a feeling of high confidence within both the committee and NASA, as well as among the hundreds of thousands of contractor personnel, plus a "can-do" spirit which dominated the entire program outlook. The

searching inquiries which the committee and the staff repeatedly made were all based on the assumptions that the program was a sound one and that someone was asking the right questions. The danger of fire was recognized, and studies were made on space rescue, but they were primarily directed at rescue in space. Few, if any, in NASA, on the committee or anywhere in the country ever asked the question which occurred to everyone by hindsight: Why was a lot of flammable material allowed in a pure oxygen pressurized atmosphere at a time when the secured hatch made it so difficult and time consuming to escape?

Apollo I was scheduled to fly with its premier crew of Virgil "Gus" Grissom, Edward White, and Roger Chaffee in February 1967. All three astronauts were strapped down in the spacecraft, simulating a launch, in their bulky space suits. A scheduled test of "emergency egress practice" was on the list but by 6:30 p.m. on January 27, 1967, they had not quite reached that point on the checkout. After the hatch on Grissom's Liberty Bell 7 Mercury capsule had prematurely blown off just after his splashdown, nearly drowning him, it was decided to design the Apollo hatches so they could not be blown off with explosive bolts. Hence it took a very strong man at least 90 seconds to turn the lever and lift the hatch from the inside.

In Fort Worth, Tex., on January 27, Teague addressed 2,000 high school seniors at a Career Conference at Texas Christian University. As examples of outstanding careers, he introduced Audie Murphy, the most decorated soldier in World War II; his son, Jack, an Air Force jet pilot; all-American football star Eddie LeBaron; and Astronaut Vance Brand. Teague and Brand were having dinner in Fort Worth that evening when they received the stunning news that a fire in the spacecraft had snuffed out the lives of three of their good personal friends. NASA Administrator Webb telephoned Teague with the grim news.

Immediately after the tragic fire, and during the investigations which followed, the attitudes and decisions of the Science Committee were very significant in their effect on the future of Apollo and the entire space program. In some quarters there was a feeling after the fire that the entire Moon flight program should be reappraised, stretched out and changed in emphasis. Had the accident occurred in space without sufficient means to investigate the circumstances, it is probable that the effect would have dealt an even more serious blow to the program. But the members of the Science Committee immediately rallied to the defense of the program after the fire.

This occurred in several ways. On the day following the fire, most members of the committee were interviewed by the news media. The

consensus of their comments was that it was vital to get to the bottom of why the accident had happened, what changes should be made to insure that a similar type of accident would not happen again, and a determination to press on with the program.

THE COMMITTEE INVESTIGATION

Three days after the fire, Chairman Miller assigned the responsibility for a committee investigation to Teague's Oversight Subcommittee, stressing that he wanted a "comprehensive and impartial investigation." Although the Senate Committee on Aeronautical and Space Sciences began investigative hearings shortly after the fire, Teague decided that more meaningful hearings could be held once the full report of the NASA Review Board became available early in April.

In a colloquy on the House floor on January 30, numerous members of the Science Committee made it clear that they favored a vigorous continuation of the program, despite the tragedy. Chairman Miller stated on that occasion:

If the Almighty were to grant them the privilege of communicating with us, they could not help but say—carry on, you must not stop now, do not let our deaths be meaningless, and do not throw away what we have worked so hard to accomplish up to now.

Teague added:

If the meaning of their lives is to be sustained, we must take up the challenge of space they faced unafraid. Their quest for mastery of space must now be carried forward by their fellow astronauts. There can be no greater memorial to Grissom, White, and Chaffee than realization of the goals which they sought.

Majority Leader Albert told the House:

They have paved the way. Their brave companions, and men like them in the future, will carry on until the job they helped start is done.

A frequent critic of the Moon program, Representative Thomas Pelly (Republican of Washington), was affirmative in his advice to his colleagues:

I suggest that despite the accident the program will go forward and succeed.

And Representative J. Edward Roush (Democrat of Indiana), asked and answered a key question:

Where shall we go from here? We shall do just as these astronauts, whom we now honor, would want us to do. We shall continue to press forward with the determination that we shall attain this national goal for which they gave their lives.

Finally, Representative Don Fuqua (Democrat of Florida) related to the House that he had discussed the risks with the astronauts, all of whom understood very clearly the dangers involved. Fuqua added:

The task for which they gave their lives they knew was worth the sacrifice. This Nation could not honor their memory more than to continue its quest for knowledge.

In a letter to the members of the Oversight Subcommittee on March 22, 1967, Chairman Teague outlined the scope of the investigation and scheduling of witnesses. He bluntly stated:

It is my intention to conduct full and complete hearings on all matters relating to the accident. If additional testimony is needed to clarify any issue, such testimony will be taken. However, it is also my intention to complete the hearings as expeditiously as possible, including night sessions if necessary, in order that the public may have all the facts as soon as possible, and in order that the United States may get on with the program. * * *

In view of the recent press coverage concerning alleged statements of inadequacies in the Apollo program, I am inviting any member of the public, including employees of the Federal Government, to submit to the subcommittee for consideration any relevant statement or evidence concerning the subject under inquiry.

Teague stunned NASA by his initial reaction to the Review Board report. He said he was "outraged and hurt" at the carelessness and poor workmanship revealed. He said he was "surprised and disappointed at the number of mistakes" by both NASA and North American Aviation, Inc. He labeled the report as "shocking" and "unbelievable" and said it was a "broad indictment" of both NASA and its contractors. Teague followed through on his determination to keep the subcommittee in session mornings, afternoons, and in evening sessions until 10:30 p.m. Staff members like Jim Wilson slept in their offices in the Rayburn Building. It was clear from the chairman's attitude that the inquiry would be thorough and that everybody would get his say.

The reaction of most members of the Science Committee, and the manner in which they conducted the House investigative hearings, did a great deal to help stabilize the program and public reaction thereto. Some members challenged NASA's decision to set up a primarily internal investigative Board of Review, which Administrator Webb persuaded President Johnson was necessary in order to get the quickest evaluation of what must be done to get the Moon program back on schedule. For example, on the opening day of the hearings, this interchange took place between Representative Larry Winn, Jr. (Republican of Kansas) and Webb:

Mr. WINN. Mr. Webb, do you think it might have been wiser now, under the circumstances, and in the face of criticism, to have picked a completely outside investigating board?

Mr. WEBB. No, I do not. I do not think that the United States of America would have as complete information about this accident and all circumstances related to it or be in as good a position to move on with the next phase which is to get ready to fly the Apollo Saturn system.

A majority of the Science Committee defended Webb's decision, particularly in view of the thoroughness of the Board of Review report, which was completed in minute detail and combed over thoroughly by the committee both in public hearings and on-the-spot investigations at Cape Kennedy on April 21, 1967.

On the opening day of the committee hearing, Science Committee members clashed with Webb over his allegation that appropriation cuts had caused the deficiencies which the Board of Review pointed out. Daddario, in particular, documented the fact that there was no evidence to bear this out, and, furthermore, that the most severe reductions had occurred at the Bureau of the Budget level.

Members were angered at the suggestion by a North American Aviation witness that Grissom may have kicked a wire to cause the spark which ignited the fire. Representative William Fitts Ryan (Democrat of New York), Representative James G. Fulton (Republican of Pennsylvania), and others pointed out that Grissom would have had to be a contortionist to have kicked the wire.

The news coverage of both the fire and the investigation was as intense as the fire itself, and no doubt prompted some members of the committee to take very critical stances to attract publicity. Ryan, in particular, conducted a vendetta against NASA on virtually every point which the press seemed interested in headlining. On the other hand, NASA bungled its own public relations with reference to the so-called Phillips report. At first NASA denied it existed, then refused to release it, then tried to indicate it had acted fully on its recommendations.

THE PHILLIPS REPORT

Maj. Gen. Samuel C. Phillips of the Air Force, as NASA's troubleshooting program director of the Apollo program in the Office of Manned Space Flight, presented to North American Aviation, Inc., a caustic review of management deficiencies as a result of his 1965 investigations. In a covering letter dated December 16, 1965, to J. L. Atwood, President of North American Aviation, General Phillips had made these comments concerning poor quality control and inferior workmanship on the Apollo spacecraft and Saturn:

I am definitely not satisfied with the progress and outlook of either program and am convinced that the right actions now can result in substantial improvement of position in both programs in the relatively near future.

Enclosed are ten copies of the notes which we compiled on the basis of our visits. They include details not discussed in our briefing and are provided for your consideration and use.

The conclusions expressed in our briefing and notes are critical. Even with due consideration of hopeful signs, I could not find a substantive basis for confidence in future performance.

Attached to General Phillips' letter, as he indicated, were his notes on the deficiencies uncovered at North American. At one point, this comment was made under the heading of "Summary Findings":

There is no evidence of current improvement in NAA's management of these programs of the magnitude required to give confidence that NAA performance will improve at the rate required to meet established program objectives.

As the hearings were getting underway, Webb and General Phillips called on Teague and persuaded him that it would not be in the best interests of NASA's frank and confidential relationships with their contractors to release publicly the notes which General Phillips had prepared. When Representative Ryan first raised the issue in the committee hearing with North American's president, J. L. Atwood, on April 11, the response was evasive:

Mr. ATWOOD. The Phillips report to whom?

Mr. RYAN. Has not that been discussed with you?

Mr. ATWOOD. I have heard it mentioned, but General Phillips has not given us a copy of any report.

Representatives Wydler and Rumsfeld joined Ryan in efforts to pry the Phillips report out of either North American or NASA. Wydler had this exchange with Dale D. Myers, vice president of North American:

Mr. WYDLER. Do I understand that no one in North American Aviation has ever seen General Phillips' report?

Mr. MYERS. We will have to identify the date or something that will give us an opportunity to check on it.

Mr. WYDLER. I have read about the report. You mean you never have heard of this report?

Mr. TEAGUE. Will the gentleman yield to the Chairman?

Mr. WYDLER. Yes.

Mr. TEAGUE. I have asked about the Phillips report. It is my understanding this is nothing more than a group of notes that General Phillips kept in the audit management of working with North American. There really is no Phillips report. You will certainly have a chance to ask General Phillips if he has a report.

In the Senate hearings, Senator Walter Mondale (Democrat of Minnesota), tipped off by Jules Bergman of ABC (who had seen a copy of the Phillips report at NASA Headquarters), unsuccessfully attempted to obtain a copy for the Senate committee. Although a month later NASA did supply a copy to that committee on April 12, Webb instructed his subordinates to stonewall requests for the report. Nevertheless, Teague asked NASA to sketch in the background of the report. On the evening of April 12, Teague at one stage of the hearings turned to the NASA witnesses and said:

Gentlemen, will you tell Mr. Wydler what the Phillips report is?

Answering, General Phillips read to the committee a carefully prepared statement explaining his review of North American's operations in 1965. The atmosphere became tense between Ryan and Teague with the following bitter exchange:

Mr. RYAN. General Phillips, did the notes which you handed to Mr. Atwood in December of 1965 relate to workmanship?

General PHILLIPS. As I recall, in regard to their manufacturing——

Mr. TEAGUE. The Chair can advise General Phillips he can answer whatever he wants to. If I were in your position and asked that kind of question, I wouldn't answer. If you want to, you can. * * *

Mr. RYAN. I object to the instruction by the chairman to the witness.

Mr. TEAGUE. You can object all you want. The chairman will make his ruling and he has made it. * * *

General PHILLIPS. May I check with counsel?

Mr. RYAN. Did the lawyer also write the statement, General?

General PHILLIPS. I didn't ask him.

Dr. MUELLER. Mr. Ryan——

Mr. RYAN. My question, with all due respect, was addressed to the general——

Mr. TEAGUE. Would the gentleman submit his request in writing, and I will transmit it to the agency for what answers they think are appropriate?

NASA, however, continued to refuse to submit either the notes or the report to the House committee. In response to a question by Representative Rumsfeld, Mueller told the committee that there was no correlation between the findings of the Phillips report and the findings of the Apollo Review Board. Aside from some criticisms of slipshod quality control, Mueller's general conclusions are sustained. This makes Webb's strong resistance to release of the report even more puzzling, in the opinion of this writer. One can only speculate that Webb felt that publication of the many deficiencies in North American's performance would undermine confidence in NASA's ability to administer the space program, plus the ability and competence of North American as a prime contractor. There were also suggestions that Webb was still sensitive about the fact that North American had not been given the highest rating by the Source Evaluation Board in bidding for the first big Apollo contract.

On the closing day of hearings, Fuqua touched on a problem which concerned every member of the committee, in these remarks to Webb:

I think the committee has gone out of its way to cooperate with NASA in every way. I am getting the feeling that maybe you haven't really cooperated with us in not providing us with the information about some of these management problems that you have with the various contractors. I would certainly hope in the future, with both of us sharing some of the blame, that we can try to work more closely together, and the committee can be more closely informed about the problems.

Unable to obtain any satisfaction through the committee or from NASA, Ryan decided to proceed on his own. From a source he would not disclose, he received a copy of the Phillips report. With the help of Washington Evening Star Reporter William Hines, Ryan ran off duplicates of the report at the newspaper office and then called a press conference to distribute them publicly. Despite the fact that Ryan had the text of the Phillips report printed in the Congressional Record of May 1, 1967, Webb would never concede either the accuracy or completeness of the Ryan version. The issue still troubled Webb many years later, as he wrote in his foreword to NASA's Administrative History, 1963-69:

One of the difficult matters which faced NASA during my term as Administrator was the demand, in the context of the congressional investigations of the Apollo 204 fire, for the public release of what became known as the Phillips report. This was a collection of contractor evaluations generated by a group under Maj. Gen. Samuel C. Phillips, Apollo Program Director, about a year previous to the fire. NASA's response to the requests of individual legislators to produce these evaluations for release to the public was based upon a strong need not to destroy the system which had been carefully worked out over the years whereby contractors and their key personnel cooperated to the fullest extent in assessing inadequacies in performance of both in-house and out-of-house organizations and equipment. This system was designed to assist in overcoming the inadequacies rather than to fix blame.

Although Ryan, in letters to both Teague and Chairman Miller, asked that the committee seek to obtain a fully authorized copy of the Phillips report and incorporate it into the official record of the fire hearings, no action was taken. Following an executive session with the Senate committee at which Webb furnished a copy of the report to the Senate committee, Webb offered to do the same for the House committee. But Chairman Miller advised Webb on May 17:

I appreciate your furnishing me with the information on your agreement with Senator Anderson relative to making certain details of the original Phillips notes available for staff study.

Before we make any arrangements in this committee, I would want to assure myself that all of the members of the committee are available to receive such information which can be presented by NASA. It so happens that in the next 2 or 3 weeks a number of our members have pressing engagements outside the city. For example, you will recall that the Paris Air Show is scheduled to take place shortly and we have several members and staff planning to attend.

There was no further action.

Another report, made by a North American employee, Thomas R. Baron, was not only made available to the subcommittee, but Teague also invited Baron to testify at special field hearings of the subcommittee at Cape Kennedy on April 21. Baron, a "preflight inspector," had listed a number of incidents and deficiencies which he had observed, and reported, only to be dismissed from his job for his pains. A large percentage of these deficiencies North American acknowledged were

accurate and were being corrected, while others were denied or rejected. The fact that Baron, a subordinate employee, was allowed to testify and that Teague also invited anyone else who wished to testify to step forward, added credibility to the Teague investigation.

On May 10, Webb, Seamans, and Mueller returned to the subcommittee and presented their recommendations. Taking up each of the recommendations of the Review Board, NASA indicated that drastic measures were being instituted to eliminate combustible materials from the spacecraft, to design a new hatch which would enable escape from within in a few seconds rather than the 90 seconds previously required, space suits were being redesigned to make them fireproof, materials in the spacecraft were being fireproofed, and many other measures were being taken to prevent leakage at metal joints and otherwise recondition the spacecraft to guarantee the safety of the astronauts. A nitrogen/oxygen mixture was substituted for pure oxygen at ground level, going toward pure oxygen for use in space.

EFFECT OF THE TEAGUE COMMITTEE HEARINGS

Despite the committee's somewhat ambiguous handling of the Phillips report and the North American contract, the Teague subcommittee hearings were impressive in their thoroughness. Astronaut Frank Borman, as a member of the review board, bore a heavy burden of the testimony after the fire, and also personally assisted the subcommittee members in their excruciatingly personal examination of every phase of the Cape Kennedy details. Borman had these conclusions:

My own particular association with the committee was most frequent during the investigation into the Apollo 204 fire. The investigation was tough, impartial, and a positive factor in the ultimate success of the Apollo program. Had the committee been so inclined, it is conceivable the lunar program could have been delayed or abandoned at that point. Instead, it proceeded with renewed vigor and determination. I am confident that the maturity of the chairman and senior members of the committee had a great deal to do with its independent weighing of the facts. * * * Congressman Teague and the committee members contributed immeasurably to the final success of the program.

Col. Rocco Petrone also observed concerning Teague:

To me, it was his actions during the fire that kept us at NASA alive. He very coolly and smoothly played his role in oversight to make sure all things came out, and at the same time he kept us together—because there was a political opportunity to make NASA a scapegoat.

Although Representative H. R. Gross (Republican of Iowa) repeatedly called for Webb's resignation as a result of the fire, the committee rallied to the support of both Webb and the Apollo program. Wydler, a strong NASA critic, stated as the hearings ended:

I want to say this to you, Mr. Webb. Over the past few years *** I probably have been one of the most critical members on this committee of NASA *** It appeared to me *** that you have had it too easy for your own good from this committee. This is not a criticism being directed inwardly at the Congress and this committee. I feel right now that you got less criticism than you deserved (in the past, but now) you are getting more criticism than you deserve. I don't intend to add to it for that reason.

In awarding Teague NASA's Distinguished Public Service Medal on October 3, 1978, NASA Administrator Robert A. Frosch commented:

The single episode which best epitomizes Mr. Teague's profound faith in the space effort, was the leadership he demonstrated at the time of the Apollo fire in early 1967. The space program was in severe jeopardy because of the tragic deaths of the Apollo crew; many influential Americans questioned the wisdom of proceeding with the lunar landing program; the basic concept of the space effort was challenged; and many potentially disrupting actions were being proposed. The dynamic leadership of Chairman Teague spurred a prompt identification of the issues and a clear-cut course of action to resolve them. Undoubtedly, more than any other single individual, Chairman Teague "saved" the program and redirected our energies in a direction which resulted in the successful lunar landing within the decade of the 1960's.



Chairman Teague and members of his investigating committee inspect materials recovered from the Apollo spacecraft after the fire. From left, Teague, Representative Guy A. Vander Jagt (Republican of Michigan), Astronaut Frank Borman, Representative Ken Hechler (Democrat of West Virginia).



Five astronauts testifying April 17, 1967, before Science and Astronautics Committee, following the Apollo fire: From left, Frank Borman, James A. McDivitt, Donald K. (Deke) Slayton, Walter M. Schirra, Jr., and Alan B. Shepard, Jr.

During the week following the release of the Apollo Review Board report, when Teague was holding daily Oversight Subcommittee hearings morning, afternoon and evening, he spent a good deal of time during committee recesses working behind the scenes to help repair the shattered morale of the NASA Apollo team. Teague was busy on the telephone with NASA and contractor personnel, handling inquiries from the press, appearing on television programs like NBC's "Today" show and ABC's "Issues and Answers" with Astronaut Frank Borman. Tough, thorough, fair and exacting while he presided over the Oversight Subcommittee in the glare of publicity in the huge and imposing committee room in 2318 Rayburn Building, Teague usually asked the witnesses to stop by for a relaxing chat in his friendly office around the corner from the forbidding hearing room.

Five astronauts who appeared before the committee—Borman, Shepard, Slayton, McDivitt, and Schirra—spent considerable time in Teague's office. He wanted to be sure that they understood that the purpose of the searching hearings was not to find scapegoats through a witch hunt, but to get to the bottom of what really happened and what needed to be done to correct deficiencies, not only to protect the astronauts, but to inform the public and restore confidence in the program.

Perhaps it took a medical doctor really to understand what Teague was trying to do behind the scenes during the week of the hearings. Dr. Charles A. Berry, Director of Medical Research and Operations at the Manned Spacecraft Center (the personal physician for the astronauts), wrote to Teague on May 1, 1967:

I want to express my deep personal gratitude for your many kindnesses during the hectic week of hearings in Washington. The very effective professional manner in which you chaired these hearings should be made known to every American and should indeed make one proud of our Congress. It was certainly a morale-booster for all of us in the program.

The great understanding and friendship shown to me by you and your wife and the two wonderful Texas barbecued steak dinners in your office will never be forgotten. You made a week, which could have been unbearable, into a memorable experience.

On trips to Texas, Teague also went out of his way to call on the widows and families of Gus Grissom, Ed White, and Roger Chaffee, in an attempt to console them. On April 18, 1967, a hand-written note came in from retired Maj. Gen. Edward H. White:

DEAR MR. TEAGUE: Mrs. White and I wish to commend and congratulate you for the calm and dignified manner in which you conducted the hearing on the Apollo tragedy.

The exact cause of the accident may never be known, and I am convinced that it was a freakish coincidence that would never occur again, and that all reasonable precaution could not have prevented.

The conquest of outer space must be pushed aggressively if our Nation is to retain its technological leadership. Astronaut Ed White would have insisted on it.

Sincerely,

EDWARD H. WHITE,
Major General, USAF (ret.)

Teague responded to General White on May 12, 1967:

I wish you could know how very much I appreciate your letter of about a month ago. It has been a most difficult task for me to conduct the hearings on the Apollo tragedy.

It was not my desire to protect anyone or to persecute anyone; but to paint a clear picture for the American people of the space program. However, with the press interested mostly in headlines, it was rather difficult. I think it is all over now and I hope we have been fair to everyone concerned, including your wonderful son, Ed White.

After the fire, the Oversight Subcommittee rode herd on both the technical and administrative changes which were carried out. Boeing was assigned a technical integration and evaluation contract, which enabled NASA to have an extra watchdog. There was a wholesale personnel shakeup at North American Aviation. Harold Finger was promoted from NASA's Director of Nuclear Systems and Space Power to Associate Administrator for Organization and Management. As a result of the fire and the Oversight Subcommittee hearings, and the initiative of Representative Donald Rumsfeld (Republican of Illinois), the authorization bill passed in 1967 included an Aerospace Safety Advisory Panel to report on and make suggestions regarding facilities and operations. The bill ran into stormy seas both in the committee and on the House floor. There were 36 pages of various minority views out of the 194-page committee report.

Fulton caught his colleagues by surprise with a motion to recommit the authorization bill with provisions for cuts of about \$170 million below NASA's budget request, and for the establishment of the Aerospace Safety Advisory Panel. An even greater surprise occurred when Fulton's recommittal motion passed by a rollcall vote of 239 to 157. One Democrat (Ryan) and seven Republicans (Fulton, Roudebush, Pelly, Rumsfeld, Wydler, Winn, and Hunt) on the committee voted to recommit the bill. It then passed as amended by the recommittal motion by a 342 to 53 vote. The final conference committee version passed in 1967 authorized \$4.865 billion—or \$235 million below what NASA had requested. A big slash was made in the Apollo applications program, which was clipped down to \$347 million in contrast to the \$454 million originally asked by NASA.

Once again, Gross was the most outspoken critic of the manned lunar landing, proclaiming:

I live in fear of the day when, if ever, we plant a man on the Moon because if we find a single, living human being on the Moon, this Government will start a whole new multibillion-dollar foreign giveaway program—a whole new foreign aid program.

With the encouragement and full support of the Science Committee, NASA made a brilliant recovery from the catastrophe on pad 34. Apollo 4, the first unmanned Saturn V, was launched in November 1967. Teague characterized it as "the free world's largest and most complex space vehicle." In April 1968, the Saturn was again successfully tested in near-Earth orbit, and driven back into the atmosphere at the 25,000-mile-an-hour speed of a return trip from the Moon. Despite another successful attack on the Apollo applications program by Fulton in 1968, the committee lines held to preserve support for the Apollo program, and the authorization bill survived by a 262 to 106

vote. A conservative-liberal coalition cut across party lines to mount opposition to the bill because of an unbalanced budget, the Vietnam war, and the pressure of social programs.

Although the fire probably delayed the lunar landing by about a year, and was a severe blow to the morale of all concerned, by 1968, there was a new air of optimism in the committee and NASA about the chances for success in 1969. At the beginning of 1968, the following was the lineup of members of the Manned Space Flight Subcommittee:

Democrats

Olin E. Teague, Texas, *Chairman*
 Emilio Q. Daddario, Connecticut
 Joe D. Waggoner, Jr., Louisiana
 Don Fuqua, Florida
 William J. Green, Pennsylvania
 Earle Cabell, Texas
 Robert O. Tiernan, Rhode Island

Republicans

James G. Fulton, Pennsylvania
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Edward J. Gurney, Florida
 Donald Rumsfeld, Illinois

Several changes in the composition of the committee, mainly as a result of the 1968 elections, produced the following roster of the subcommittee in 1969:

Democrats

Olin E. Teague, Texas, *Chairman*
 Emilio Q. Daddario, Connecticut
 Joe D. Waggoner, Jr., Louisiana
 Don Fuqua, Florida
 Earle Cabell, Texas
 Bertram L. Podell, New York
 Wayne N. Aspinall, Colorado

Republicans

James G. Fulton, Pennsylvania
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Donald Rumsfeld, Illinois
 Larry Winn, Jr., Kansas

The first manned Saturn flight of Apollo 7, a perfect textbook mission, was completed in October, followed by the famous circum-lunar voyage of Borman, Anders, and Lovell, at Christmastime 1968.

True to his custom, Teague took his subcommittee on its annual whirlwind tour of NASA installations and key Apollo contractors prior to the 1969 hearings, which he opened with these comments:

This year is perhaps the most crucial year in our national space program. Apollo 9 is still in orbit, and Astronauts McDivitt, Scott and Schweickart are performing with distinction. The lunar module on the flight which will be completed this Thursday has justified our faith in the ability of the NASA-industry team to accomplish our national objective of a lunar landing in this decade.

A NEW ADMINISTRATOR: DR. THOMAS O. PAINE

With only a few months to go before realizing the goal of the decade, NASA was represented before the committee in 1969 by a new Administrator, Thomas O. Paine. Webb, who had fought so hard

and successfully through the 1960's, was only a spectator and no longer the man in charge when the committee and NASA jointly moved toward that golden moment when Neil Armstrong first set foot on the Moon on July 20, 1969.

On September 16, 1968, Webb had announced at a White House news conference that he would resign effective October 7, his 62d birthday. President Johnson soon thereafter appointed Paine as Acting Administrator, and following President Nixon's nomination, Paine was confirmed by the Senate as Administrator on March 5, 1969.

Webb's departure 9 months before the manned lunar landing represented the end of an era, the close of 8 extraordinarily successful years during which his relations with the Science Committee had been close and generally very cordial. When Webb resigned, Teague commented:

Jim Webb has met the test of great responsibility and the demand of leadership. His abilities as a manager and a leader will be sorely missed. But he can leave NASA with a realization that he had established the greatest technological team that the world has ever known—a team well capable of reaching the goals which have been set forth.

Mosher put it this way:

It was very fortunate that a fellow with Jim Webb's genius headed NASA at just the right time to communicate with a bunch of people like we are. He knew government inside and out, and he was a political animal, he knew politics and how to deal with politicians. He was a born salesman, just a terrific salesman. I could have seen where some terrifically competent engineer or scientist might have been chosen to head NASA, and he would have been a disaster in terms of talking to us.

At one of the night hearings on the Apollo fire, a question was posed to Webb on the adequacy of North American Aviation's work on the Apollo contract, and Webb's response was so wide ranging and expansive as to prompt Teague to observe:

I like Mr. Webb. He has a wonderful reputation but it is not for short answers. One NASA official commented:

Trying to make conversation with Jim Webb is like trying to drink out of a fire hydrant.

Webb was a genius at organizing the vast, multibillion-dollar enterprise which relied on thousands of private contractors and subcontractors, employing over 400,000 people throughout the Nation. The Science Committee marveled at his ability to present a very complex budget every year with the enthusiasm of a true believer, and the detailed knowledge of a man who had done his homework thoroughly. Congress respected Webb, and the members of the Science Committee regretted seeing him leave.

On the eve of the Moon landing, the Science Committee faced a tough fight in Congress over the perennial issue of declining funds for

NASA. The high-water mark for NASA appropriations had been reached in calendar year 1964 when NASA was furnished with \$5.25 billion, and ever since then the funds had dwindled each year. At the beginning of 1969, NASA officials publicly indicated to the committee, for the first time, that they would offer three alternative budgets, one of which was officially approved by the Bureau of the Budget. First, there was a barebones budget of \$4.2 billion which deferred new projects and was designed as a "minimum program for continuing ongoing programs." At the same time, NASA submitted an optional budget of \$4.7 billion as the amount "required to maintain world leadership in space." The Bureau of the Budget responded by including only \$3.76 billion for NASA—\$1 billion short of the optimum, and half a billion dollars below the minimum. These figures furnished a clear-cut challenge to the Science Committee, which responded with a recommendation that some \$250 million should be added to the rockbottom budget, about \$200 million of which was earmarked for manned space flight and Apollo Applications. However, the Senate stuck to the budgeted figure and persuaded the House in conference to conform to the budgeted figure of \$3.76 billion.

Fuqua helped stave off some of the opposition which had been grumbling about duplication between Apollo and the Air Force's Manned Orbiting Laboratory program. He pointed out that the Air Force was abandoning the MOL, leaving the manned space field exclusively to NASA. And Representative Bob Casey (Democrat of Texas) helped spice the debate with this gem:

If Queen Isabella, after she pawned her jewelry to send Columbus on his adventurous trip to the New World, had had to stand for reelection, she would have probably been beaten for taking that gamble * * *. Let us show the strength and the fortitude and the leadership that we need to keep this country first in space.

After spirited debate, the authorization bill passed by a 330 to 52 margin on June 10, 1969.

Administrator Paine had a mission which was indeed painful: he came to NASA to preside over the dissolution of much of NASA's former power, as a result of severe budgetary constraints. Largely through his personal leadership, however, there was inaugurated a new spirit of scientific cooperation with the Soviet Union. From Paine's initial contacts with M. V. Keldysh, President of the Soviet Academy of Sciences, grew the Apollo-Soyuz linkup of American astronauts and Soviet cosmonauts in 1975 (see chapter X). After eight years of solid

foundations which were laid by Webb, Paine had the honor of serving as NASA Administrator when the giant leap for mankind was recorded on July 20, 1969.

Well over 200 House and Senate Members, 19 Governors, 60 Ambassadors, countless mayors, about one million visitors, plus millions more television viewers throughout the world watched in awe on the morning of July 16, 1969, as Armstrong, Aldrin, and Collins successfully were launched moonward from pad 39-A at Kennedy Space Center. Once the astronauts had successfully landed on the Moon and returned to splashdown in the Pacific Ocean on July 24, Bob Gilruth, the Director of the Manned Spacecraft Center in Houston, took time out to send a little note to his old friend, Tiger Teague:

Through all the stress and turmoil, the good days and the tough ones, you have stood with us—a tower of strength and an inspiration.

My friend, I salute you!



Dr. and Mrs. Robert R. Gilruth greet Congressman Teague on one of his many visits to the Manned Spacecraft Center in Houston, Tex.



Representative Joseph E. Karth (Democrat of Minnesota), left, inspects a model of the Mariner spacecraft with NASA Administrator James E. Webb.

CHAPTER VII

Space Science, Applications, and Advanced Research, 1963-69

Congressman Joe Karth of Minnesota dominated every subcommittee session he chaired. To a far greater extent than most chairmen, he not only led the questioning, but his insistently probing mind and meticulously thorough preparation enabled him to set the tone of all his subcommittee activities and dominate the public hearings. Joe Karth was no committee dictator, and his subcommittee members always were given free rein and plenty of opportunity to participate. He built up respect among his subcommittee members on both sides of the aisle, winning and retaining that respect through sheer force of personality and knowledge of the subject matter. But there was never any doubt who was boss.



The Karth subcommittee in 1963-64: Seated, from left, Representatives William J. Randall (Democrat of Missouri), Thomas G. Morris (Democrat of New Mexico), Chairman Karth, Full Committee Chairman Miller, J. Edgar Chenoweth (Republican of Colorado). Standing, Representatives Neil Staebler (Democrat of Michigan), Thomas N. Downing (Democrat of Virginia), William K. Van Pelt (Republican of Wisconsin), Charles A. Mosher (Republican of Ohio), and James D. Weaver (Republican of Pennsylvania).

As noted in chapter IV, Karth became the first of the eight freshman Democratic charter members who joined the Science Committee in 1959 to chair a subcommittee. Third in seniority among the eight new members, Karth moved up to become a subcommittee chairman early in 1961 following the death of Representative David Hall (Democrat of North Carolina) and the 1960 election defeat of Representative Leonard Wolf (Democrat of Iowa).

After some reshuffling of the subcommittee jurisdictions to conform with internal NASA reorganizations, Karth wound up in 1963 chairing a subcommittee with the formidable title "Subcommittee on Space Science and Advanced Research and Technology," with the following Members:

Democrats

Joseph E. Karth, Minnesota, *Chairman*
 Thomas G. Morris, New Mexico
 William J. Randall, Missouri
 Thomas N. Downing, Virginia
 Neil Staebler, Michigan

Republicans

J. Edgar Chenoweth, Colorado
 William K. Van Pelt, Wisconsin
 Charles A. Mosher, Ohio
 James D. Weaver, Pennsylvania

The lion's share of the time and effort of the Karth subcommittee was devoted to wrestling with the annual NASA authorization bill. This meant poking and probing, trying to measure and weigh the arguments advanced by some outstanding scientific talent on how much should be spent for a bewildering variety of scientific experiments. In 30 separate public sessions and additional no-holds-barred, off-the-record or executive meetings, the Karth subcommittee carefully quizzed NASA witnesses to establish whether their money requests were fully justified, whether they were needed in 1963, what they would contribute toward future programs, what would happen if they were canceled or deferred and whether they were important enough to receive support in the rest of the Congress and the Nation.

Karth confessed to his colleagues in presenting the Space Science and Advanced Research portion of the NASA budget on the floor on August 1, 1963:

There is nothing really exciting or glamorous about basic research and technology and I might add there is nothing really glamorous about space sciences, either.

He pointed out that his subcommittee had labored "under very trying circumstances, with very little, if any, fanfare, on a most tedious and most difficult job." Karth was well aware, as were other members of the subcommittee, of the pulse-throbbing public excitement right next door involving the astronauts in the Mercury program, and all the glamor associated with the race to get to the Moon. Meanwhile, the

Karth subcommittee was dealing with "more than 50 highly technical, highly scientific, and grossly difficult to understand programs" which he generally described to his colleagues in the House as follows:

Just to give you a feel for the diversity of projects before the committee, let me call to your attention that they range through energetic particle explorers, ionospheric monitors, physical and astronomical observatories to propulsion systems of all types, chemical, nuclear, and electric, research grants and facilities to universities and colleges, space programs of all kinds, human-factor systems, the supersonic transport, international satellites, and so on.

The Karth subcommittee operated somewhat differently from the Teague Manned Space Flight Subcommittee. Some field trips were made to NASA and contractor installations, but for the most part the annual authorizations were hammered out in very intensive, exhaustive discussions in Washington between the subcommittee members on one side of the table and the responsible NASA officials on the other. There were very few agency briefings outside of the formal hearings, and no regular visits to NASA headquarters such as Teague scheduled. Karth's philosophy was that the agency should be kept at arm's length, that there should be a frank but adversary relationship, and in no event should the subcommittee develop into a kind of appendage or apologist for the agency--as he felt wrongfully occurred in some other congressional committees and subcommittees.

Karth's relations with Chairman Miller developed along an interesting pattern. Miller often used the expression "you don't get yourself a watch-dog and then do your own barking." So from the standpoint of his own philosophy as well as his reaction against the Brooks practice of not delegating much authority to the subcommittees, Miller was inclined to let Karth and the other subcommittee chairmen pursue their own courses of action. On the other hand, as a team player who believed in party regularity and was strongly inclined to go along with NASA, Miller sometimes clashed with Karth and the other subcommittee chairmen in full committee meetings. In Karth's words:

He had a fuse that was three-quarters of an inch long. That means a very low boiling point and a very hot temper. He was so pro-agency that if you asked a question that sounded in his judgment to be a negative-type question, to be one that wasn't necessarily laudatory toward the agency, he himself would become incensed and he'd rap the gavel on you. I remember that very specifically. He'd almost want to rule you out of order, and at times would rap the gavel much before your 5 minutes was up, just because he was displeased with the line of questioning you were pursuing.

In addition to the annual authorization bills, the Karth subcommittee was extremely active in oversight investigations to insure that appropriations were properly spent, that management and cost factors were being properly observed, and that the taxpayers were

really getting their money's worth in effective and efficient administration. These oversight investigations were carried on independent of the authorization hearings. Oversight investigations of Project Ranger (an instrumented, hard-landing probe to the Moon), Surveyor (soft landing spacecraft to the Moon, with lunar experiments) and Advent (military communications satellite) were successfully completed under Karth's leadership. Other early investigations by the Karth Subcommittee of Projects Centaur (launch vehicle) and Anna (geodetic satellite) are discussed in chapter IV.

One of the most nagging and difficult problems which the Karth subcommittee faced was how to justify spending some of the limited funds when you couldn't see the end result. Karth described it graphically this way:

Our scientific and technological developments which we take for granted today have their roots deep in the basic research of yesterday. I do not care if it is the automobile or the airplane or the telephone or the radio or TV * * * first came the tedious, expensive and unglamorous basic research which provided the technological breakthroughs.

On the other hand, there were some instances beyond the intangibles of basic research, where the subcommittee had to judge whether research was necessary for a mission which had not yet been clearly pinpointed for the future. A case in point was the following discussion in an executive session on May 23, 1963, on the feasibility of studying how to cope with the extreme heat of reentering the Earth's atmosphere:

Mr. CHENOWETH. What is going to be the speed of the Gemini?

Dr. BISPLINGHOFF. (Dr. Raymond Bisplinghoff, NASA Director of Advanced Research and Technology.) 25,000 feet per second.

Mr. CHENOWETH. Now the Apollo is going to be how much?

Dr. BISPLINGHOFF. It will be about 36,000 feet per second.

Mr. CHENOWETH. You could go ahead with the Apollo now?

Dr. BISPLINGHOFF. Yes.

Mr. CHENOWETH. I don't understand why you need this program.

Dr. BISPLINGHOFF. We need this program to develop the knowledge beyond the Apollo speed.

Mr. CHENOWETH. If you were sitting in our places, do you think you'd be justified in voting for something problematical and something in the future that may never come to pass?

Dr. BISPLINGHOFF. Yes, sir, I do. I think we should invest a small part of our resources into looking in the future. * * * If we come to 1970, and you ask us to reenter from one of these planets, and we have not done (the research), we are going to be in a bad way.

Mr. CHENOWETH. You think there would be any great jeopardy in postponing this one year?

Dr. BISPLINGHOFF. Our movement toward preeminence in space would be jeopardized—

Mr. MOSHER. It really postpones it. It doesn't jeopardize it.

Dr. BISPLINGHOFF. Well, I don't know quite what the word "jeopardize" means, but it certainly postpones it, and what I fear most of all is starting—giving a company a contract to develop something before the technology is ready. If there is anything that has cost this country money, it's that kind of money, and money invested in research ahead of time is well worth the effort.

WEATHER SATELLITES

On November 1, 1963, NASA's internal reorganization established the Office of Space Science and Applications, as well as the Office of Advanced Research and Technology and the Office of Manned Space Flight. This signaled an immediate reallocation of jurisdictions between the Karth subcommittee (which was renamed the Subcommittee on Space Science and Applications) and the Hechler subcommittee, which became the Subcommittee on Advanced Research and Technology. Prior to 1963, weather satellites were under the jurisdiction of the Hechler subcommittee which was at first called Applications and Tracking and Data Acquisition.

Ken Hechler, a Columbia University Ph. D., author of the combat story of the first Rhine crossing in World War II, *The Bridge at Remagen*, one-time speechwriter and researcher for President Truman and Adlai Stevenson, had been elected first in 1958 to represent the coal-rich area of southern West Virginia. A charter member of the committee, he became a subcommittee chairman during his second term in 1962.

At seven hearing sessions during August and September 1962, the Hechler subcommittee held successful hearings on weather satellites, communications satellites, and radio astronomy. For the weather satellite hearings, witnesses were called from the Weather Bureau, NASA, Department of Defense, as well as the National Science Foundation, the Department of State, and U.S. Information Agency. Chairman Hechler praised NASA for six consecutive successful launches of the Tiros (Television Infrared Observation Satellite) weather satellite, the last of which was launched while the hearings were in progress. When the hearings developed differing testimony from NASA (responsible for R. & D. on Tiros), the Weather Bureau and the Department of Defense (as operational users), Chairman Hechler called top representatives of all three agencies around the table to work out better coordination. In remarks to Deputy Assistant Secretary of State Richard N. Gardner, Chairman Hechler termed weather satellites as "tremendous weapons of freedom (which could) fire the imagination of the people throughout the world," and he urged that greater efforts be pushed forward through the World Meteorological Organization and the United Nations to make the findings from Tiros available to all peoples. In his report to Congress on weather satellites on August 1, 1963, Chairman Hechler told his colleagues:

A total of over a quarter of a million photographs have been sent back to Earth. Tiros has done a good, sturdy job in the past 3 years in identifying many hurricanes and typhoons and relaying advance warnings. Improvements in weather predictions in the future carry vast implications for farmers and businessmen. These improvements will be of prime importance in underdeveloped areas of the world.

When the Karth subcommittee was assigned jurisdiction over weather satellites at the beginning of 1964, strong support was given to the program. However, the subcommittee was disturbed to learn that a radical decision had been made by the Weather Bureau. NASA had developed and launched Tiros, a relatively simple spin-stabilized craft. At the same time, NASA was developing for Weather Bureau operational use a more complex three-axis stabilized satellite called Nimbus to incorporate more instrumentation, for weather prediction.

In September 1963, however, the Weather Bureau decided that Nimbus was too expensive and "too rich for its blood." So the Weather Bureau rather belatedly notified NASA that because of cost factors Nimbus could not be used in any operational system. To the subcommittee, this seemed to be an unfortunate and inefficient turn of events. But NASA was not to blame, and NASA continued to develop and launch more Nimbus craft to test new instrumentation, even though the Weather Bureau couldn't pay for Nimbus.

In 1965, Karth reported to the House that Tiros had run up a record string of nine straight successes, adding:

The data received from these experiments have opened up new horizons of research into the Earth's atmosphere. Pictures of cloud cover received from Tiros satellites are valuable, but new advanced sensors to measure temperature, wind velocity, and moisture content at various altitudes are now under development.

Several members in 1966 raised questions as to possible duplication among the many weather services in several different Federal agencies. However, Representatives Weston Vivian (Democrat of Michigan), Barber B. Conable Jr. (Republican of New York), and Karth all concluded that from a cost effectiveness standpoint, weather satellites were a sound investment.

In 1967, the Karth subcommittee voted to defer a \$5 million item for two additional Nimbus satellites, but the Senate and the conference committee overruled their efforts. General Electric obtained the cost-plus-fixed-fee contracts, and when the new weather satellites were launched, they still proved too expensive for the Weather Bureau to opt to utilize them.

Karth told the House in 1968:

NASA's meteorological satellite projects have been the most successful of all NASA programs. The United States has launched 18 meteorological satellites without a single failure * * *. The Environmental Science Services Administration—ESSA—is now using satellites and sensors developed by NASA for weather prediction on a daily basis.

Mosher also praised the fact that NASA had achieved "an almost unbelievable 100-percent record of success" in launching weather satellites.

At the end of the decade, the support of the Karth subcommittee for weather satellites had helped make this program one of the most popular aspects of the applications program. The effective warnings afforded by weather satellites enabled hundreds of thousands of residents of the coastal areas to evacuate successfully and safely, rather than be overwhelmed, and suffer the fate which residents of the same areas had met in prior hurricanes.

COMMUNICATIONS SATELLITES

Karth and Hechler, who joined the committee together in 1959 as charter members, sat next to each other in full committee meetings and never had a single harsh word with each other even though they frequently were on opposite sides of substantive issues. Hence it was that when both subcommittee chairmen investigated communications satellites in their respective subcommittees in the summer and fall of 1962, no sparks of jurisdictional squabbles were evident.

As noted in chapter IV, Karth's subcommittee had a very productive series of hearings on the Centaur launch vehicle in mid-May of 1962. These hearings revealed serious development problems with the Centaur launch vehicle which the Department of Defense had banked on to boost its communications satellite Advent into synchronous equatorial orbit. In June 1962, control of the Advent program was shifted from the Army to the Air Force. Chairman Miller, concerned at possible duplication between the NASA and Defense Department communications satellite programs, asked Karth's subcommittee to follow up the Centaur investigation with an Advent inquiry in view of the fact the two programs were interrelated. In a report on November 1, 1962, Karth's subcommittee uncovered many management problems in the Advent program. The subcommittee recorded its strong support of NASA's Associate Administrator Seamans' statement that NASA and the Department of Defense—

jointly have a very great responsibility to see that the total research and development that is carried out in the communications field makes sense, that there is not undue duplication, that (DOD and NASA must consider) the total requirements of the Nation, both for commercial and for military purposes.

The Karth subcommittee predicted that DOD would never meet its schedule for Advent; what happened ultimately was that Advent was scrapped in favor of newer technology. When the Hechler subcommittee conducted its investigation of civilian communications satellites, September 18 through October 4, 1962, Representative Hechler opened the hearings with the announcement:

We are pleased to have our colleague, Congressman Karth, sit with the subcommittee. Congressman Karth's subcommittee investigated the military requirements for communications satellites. It is very useful to have that continuity with your presence, Congressman Karth.

The purpose of the Hechler hearings was to air the hotly competitive claims of the commercial developers, particularly Hughes Aircraft Co., which was developing a synchronous satellite, and Bell Telephone Laboratories, which had developed the medium-altitude relay satellite known as Telstar. "There is high expectation that the satellite will perform as designed," the Hechler subcommittee reported concerning the Hughes satellite, Syncom. In 1964 Syncom became the world's first geostationary satellite, maneuvered into synchronous equatorial orbit so it appeared to stay fixed above one spot on Earth.

Meanwhile, Telstar, which had been launched on July 10, 1962, provided a dramatic illustration of its effectiveness, in a timely fashion for the hearings. Hechler opened the October 4, 1962, hearing with this comment:

Yesterday there were millions of people in Europe who shared the thrill of the successful flight of Walter M. Schirra, Jr., by means of viewing television relayed by Telstar satellite.

As the U.S. Information Agency testified: "Communications and television are something which, unlike shooting for the Moon, can touch each person's life personally."

In 1962 and 1963, the following members were assigned to the Hechler subcommittee:

SUBCOMMITTEE ON ADVANCED RESEARCH AND TECHNOLOGY

1962

Democrats

Republicans

Ken Hechler, West Virginia, *Chairman*
J. Edward Roush, Indiana
John W. Davis, Georgia
Joe D. Waggoner, Jr., Louisiana

Jessica McC. Weis, New York
Thomas M. Pelly, Washington

1963

Democrats

Republicans

Ken Hechler, West Virginia, *Chairman*
J. Edward Roush, Indiana
John W. Davis, Georgia
William F. Ryan, New York
Richard H. Fulton, Tennessee

Thomas M. Pelly, Washington
Donald Rumsfeld, Illinois
John W. Wydler, New York

When the Karth subcommittee picked up jurisdiction over communications satellites at the end of 1963, additional emphasis was placed on the value of the NASA research and development in this area. Karth told his House colleagues in 1964:

Telstar, Relay, and Syncom are virtually household words. Hardly an American or Western European has not witnessed the miracle of intercontinental television transmitted by the first experimental communications satellites. A great deal of research still needs to be done, but an economical commercial system now appears to be just over the horizon.

At the beginning of 1965, the membership of the Karth and Hechler subcommittees changed again, producing the following lineups:

SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS

Democrats

Joseph E. Karth, Minnesota, *Chairman*
 Thomas N. Downing, Virginia
 Roy A. Taylor, North Carolina
 Walter H. Moeller, Ohio
 William R. Anderson, Tennessee
 Weston E. Vivian, Michigan

Republicans

Charles A. Mosher, Ohio
 Barber B. Conable, Jr., New York

SUBCOMMITTEE ON ADVANCED RESEARCH AND TECHNOLOGY

Democrats

Ken Hechler, West Virginia, *Chairman*
 John W. Davis, Georgia
 William F. Ryan, New York
 George E. Brown, Jr., California
 Lester L. Wolff, New York

Republicans

Thomas M. Pelly, Washington
 John W. Wydler, New York

NASA's role in the communications satellite area diminished toward the end of the decade as the Communications Satellite Corporation expanded its activities. Also, budgetary limitations were a strong factor in the phasing out of NASA research and development in communications satellites in the early 1970's.

Meanwhile, the Karth subcommittee had taken an increasing interest in the Applications Technology Satellite—an outgrowth of the Syncom program of the Hughes Aircraft Co.—as well as paving the groundwork for the highly successful Earth Resources Technology Satellite. Starting with the world-wide telecasts of the Tokyo Olympic Games in 1964, the communications satellites represented a dramatic illustration to peoples throughout the world of the success of the space program and the interest of the Science Committee in extending the program for the benefit of all mankind.

ELECTRONICS RESEARCH CENTER

Room 214-B of the Longworth Building was crowded, as usual, with spectators, witnesses, and news media representatives on the afternoon of February 26, 1963. Committee members directed their

fire at Dr. Raymond L. Bisplinghoff, NASA's Director of the Office of Advanced Research and Technology, about funds asked for an Electronics Research Center.

Karth immediately jumped in and wanted to know "how many different kinds of research centers and/or laboratories do we have in-house today?" Karth bored in with more questions:

Mr. KARTH. Before we decide that we need another in-house capability, what kind of an evaluation study do we have of the existing capability both in Government and in industry? What kind of a study do we make, Doctor? Is it a thorough, comprehensive study of all the aspects of that capability within the private industry and within Government?

Dr. BISPLINGHOFF. Yes. I feel that if you are referring to the Electronics Research Center, I feel that the—

Mr. KARTH. I am referring to any in-house capability that all of a sudden we may decide we need.

Dr. BISPLINGHOFF. I see.

Mr. KARTH. I want to know how we make the decision that we need it.

Dr. BISPLINGHOFF. I think that two of the main reasons for having an in-house capability are to give the NASA an ability to make wise decisions to embark on major aeronautical and space exploration programs involving large expenditures for purchases of equipment, complex systems, and vehicles, and to conduct and supervise research outside of the NASA in a businesslike and intelligent manner.

Rumsfeld and Gurney both raised questions about whether the Electronics Research Center would recruit talent from the outside or other areas of the country which would thereby deprive those areas of the technical expertise. Rumsfeld, in particular, was concerned that those areas like the Middle West which were rejected as suitable sites "might be even more unacceptable at a later date because of the fact that you have created this new center in Boston and attracted people from other parts of the country."

Whereupon, Chairman Miller intervened to defend NASA and explain that NASA was trying to develop capabilities in other sections of the country. He remarked to the future Secretary of Defense:

I can understand your concern in this matter, Mr. Rumsfeld. I just want you to know that we are conscious of this, but NASA is not the biggest violator in this field. If you want to go into it, take a look at DOD.

It was not long before Ryan got into the act.

Mr. RYAN. What other sections of the country did you examine which have university complexes and electronics development?

Dr. BISPLINGHOFF. We looked in the larger areas of California and New York and in other States. We looked at every part of the country, every large area where there was considerable combined strength in electronics and education.

Mr. RYAN. Did you prepare a report evaluating one area as opposed to another?

Dr. BISPLINGHOFF. Yes, sir.

Mr. RYAN. Is that available so that the committee members might inspect it?

Dr. BISPLINGHOFF. We have an internal planning report which was not devised for outside consumption. I would have to check with Mr. Webb to see whether we could allow that to go out.

When the Hechler subcommittee met on March 20, Wydler continued an attack on the Center with a series of probing questions to Dr. Seamans, who was appearing to defend the portion of the budget authorization dealing with "Personnel services, operations, and installations." This prompted Representative John W. Davis (Democrat of Georgia) to ask Chairman Hechler:

I would like to know just how much of a responsibility (for the Electronics Research Center) rests on this subcommittee and how much on Mr. Karth's subcommittee.

Hechler responded:

Well, of course, this subcommittee is concerned with personnel and personnel costs, as well as operation of installations, and you can stretch this as far as you want. I think we have a great deal to do insofar as personnel costs are concerned, without impinging on the areas of other subcommittees.

Ryan, Davis, Roush, Wydler, and Hechler all continued to quiz Seamans, who kept stressing that NASA must continue to build on strength. Chairman Hechler commented: "To them that hath shall be given." Roush observed dryly: "Thank you, Reverend."

Wydler's attack on March 20 proceeded along the following lines:

Mr. WYDLER. Could you tell me when it was that the decision was made to have an Electronics Research Center?

Dr. SEAMANS. I requested in writing the Advanced Research and Technology Office to consider the problems associated with electronics research, including the possibility of a center, I believe in January of last year; that is, 14 months ago.

Mr. WYDLER. And when was the decision to have such a center made?

Dr. SEAMANS. The decision was finally made at the time that we wrapped up the budget requests for this year.

Mr. WYDLER. And when was the decision made to locate that center in Boston?

Dr. SEAMANS. The decision was made at that time.

Mr. WYDLER. You mean this was simultaneous?

Dr. SEAMANS. Yes—

Mr. WYDLER. The thing that I am driving at here is, is it that NASA wants an Electronics Research Center, or is it that NASA wants an Electronics Research Center in Boston; which is it?

Dr. SEAMANS. The first thing we want is an Electronics Research Center, and, second, we feel the best place to locate it is in Boston.

Chairman Miller was greatly concerned about the outpouring of questions and criticisms of NASA's decision. He telephoned Webb and asked him to write an extensive letter setting forth the timetable of investigations leading up to the decision, as well as a detailed justification. Webb responded with a long letter, with attachments, dated

March 21, 1963. In the letter, Webb indicated that he had assigned to Dr. Albert Kelley a study of "NASA's present resources and capabilities in electronics research" and to recommend a plan to meet future needs. Webb reported:

Dr. Kelley's group found that although NASA was involved deeply in developmental projects covering almost all segments of the electronics field, NASA's in-house research efforts were diffused and comprised a relatively small cumulative effort.

Webb also indicated that Boston was selected because of its proximity to universities, and Boston was "an area where the industrial community has allied technical interests" and was "research oriented."

Representatives Karth, Mosher, and Weaver returned to the attack on April 3, 1963, in hearings before the Karth subcommittee. Mosher asked:

Why not get down to the nub of one question on the mind of everybody? Since I am a member of the minority party, it necessarily has to be on our mind. I refer to the nature of certain promises made by the Democratic candidate for the Senate in last year's campaign in Massachusetts; this tends to make the minority party members suspicious of any new installations which are suddenly placed in Massachusetts; and, therefore, to satisfy this curiosity of the minority members, I'd like to ask something about the process by which the location was determined.

Answering at elaborate length, Dr. Kelley concluded that "my clear-cut, unequivocal recommendation was, this was the way to go, for a new center, and put it into the right environment." One further exchange occurred:

Mr. MOSHER. So that the proposal, that this large and very important Center be built in the Boston area, made very soon after last year's election, was only a fortuitous circumstance, so far as the Senator from Massachusetts was concerned, and he played no part, his influence played no part in this decision?

Dr. KELLEY. So far as I am concerned, that is absolutely the case and my recommendation was based on the technical factors involved as to how we could upgrade the technology of the agency over the long haul. * * * Incidentally, my recommendation for the Center was made early in the fall of 1962, which Mr. Webb made clear in a letter to Chairman Miller.

Mosher's comments prompted Representative Thomas G. Morris (Democrat of New Mexico) to philosophize:

Along the same lines my good friend from Ohio was expressing a moment ago, I'm reasonably certain that the candidate for the Senate in Boston was very similar to all candidates for public office in all parts of the country.

Most of us are not exactly modest when we speak of what we can do for the country and, in particular, what we can do for our own area when we face the people of our State.

I'm reasonably sure that the Democratic candidate for the Senate from Massachusetts was not being modest, either, and I think that this should be something that should also appear in the record. There will possibly be other projects in other parts of the country that public officeholders will not be reluctant to take some of the credit for, in case they are successful.

But, by and large, I think most projects are placed where it will be in the national interest, even though some of us like to think that we have something to do with getting them—

Dr. WEAVER. What made the Boston area more desirable to NASA in contrast to Los Angeles, Pittsburgh, or some others?

Dr. KELLEY. I think you realize we were looking for electronic research competence, and we were looking for a "hothouse environment" for our little "orchid" we were trying to grow. There are many factors that one considers: transportation; available residential communities; civil engineering; criteria such as water, heat, and power which you might find in most metropolitan communities. But the principal reason was the industrial and university electronic research complex in the area * * *. Perhaps we wouldn't try to grow an orchid in the desert for we might have to build a hothouse to go along with it—

Mr. Karth. Other areas in the country, I think are not quite as destitute as the orchid in the desert. I hesitate to let this implication be in the record. I know this is not a fact.

Representative Thomas N. Downing (Democrat of Virginia), who represented the area including the Langley Research Center, pressed Dr. Kelley very hard as to why the new Center was not simply located at Langley. Chairman Miller, who up to that point had been joking facetiously about locating the facility in California, interrupted Downing and abruptly said: "This I would like to say off the record." Red-faced and angry, he proceeded to berate Downing for pressing the issue. Although Miller's remarks do not appear in the official hearing record, The New York Times reported the following day that Miller had commented: "Frankly, we're making this thing right now a question of where we are going to put it because it's going to be a plum." Miller added: "We'd all like this in our States. But do you want to make a WPA project out of this or are we interested in the space program?"

On May 1, Karth's subcommittee once again assembled to renew the attack on the Electronics Research Center. Colonel Gould established that very little, if any, facility planning had been accomplished, and a master plan simply did not exist. Karth persisted with some more embarrassing questions:

Mr. KARTH. No official study was made of this, in other words?

Dr. KELLEY. I am not sure what you mean by "official study." There was a continuing review of this problem by our group in NASA.

Mr. KARTH. Who decided we needed an electronics research laboratory?

Dr. KELLEY. The Administrator decided it. We went through—

Mr. KARTH. Then there must have been a number of people that had suggestions or discussion about it. Who were they?

Dr. KELLEY. All NASA—

Mr. KARTH. You just didn't decide this, did you, Doctor?

Dr. KELLEY. No, sir.

Mr. KARTH. Jim Webb just didn't decide it?

Dr. KELLEY. No, sir.

Mr. KARTH. There were a number of people that got together and decided we needed an electronic research lab. Who were they?

Dr. KELLEY. At least NASA senior management; I made a recommendation—

Mr. KARTH. When you say the senior management, who do you mean?

Dr. KELLEY. The senior management basically is Dr. Seamans, Dr. Dryden and Mr. Webb.

Mr. KARTH. And yourself? You four decided?

Dr. KELLEY. I don't consider myself senior management—

Colonel GOULD. I think this committee would like to know your thinking as to what it is ultimately going to cost since this is the initial increment of this project.

Dr. KELLEY. No, we are waiting for the cost study and report. That is exactly what we are doing it for, really.

Mr. KARTH. We have no design studies at all. * * * You think that one more laboratory is going to answer all of our electronics problems? Is that what you are saying?

Dr. KELLEY. It is going to allow us to focus our efforts and industry's efforts on the problems which are quite substantial.

Mr. KARTH [continuing]. By saying that just one more laboratory is going to solve 95 percent of the problems that we have in the space field, I think it's just about as ridiculous a statement as I ever heard before this committee.*** If that is necessary, why, good grief, someone should have been fired for not having proposed this thing five years ago.

When Joe Karth began to raise a storm against the Electronics Research Center in his subcommittee, Chairman Miller became very concerned about the fate of the Center and realized that Karth was in a key position to block it. So Miller talked with Speaker McCormack and asked him whether he could use his great persuasive power to change Karth's mind. According to Karth:

The Speaker called me in and he said: "This laboratory is to be built in Massachusetts, and we think it's necessary. We understand that you are opposing it, and we think you should take one more look at it."

And I said: "Mr. Speaker, I've looked at it as many times as I'm going to, and I don't think that we need it, and therefore I don't think I can approve it."

Although there were elements of power politics involved in the discussions concerning the Electronics Research Center, Karth and Webb have somewhat different recollections of the turn of events. On June 11, 1963, Karth and Webb were on President Kennedy's appointment list, from 6:30 to 6:50 p.m. The appointment was shortened because the President addressed the Nation that evening on the problems of desegregation at the University of Alabama. Colonel Gould accompanied Karth to the White House, but did not attend the meeting in the Oval Office.

Karth found the President "very gracious," and "he put his arm around me, I recall. He wanted to know all about my problems and then he told me about his." The President, according to Karth, said that he

had not known the ERC was in the budget, but now that it was he felt it would look bad for the United States to take it out. Karth responded: "Mr. President, I just don't think we need it." Webb recalls that Karth made a strong plea for the electronics capability of Minnesota. In any event, no agreement was reached.

The strategy utilized to disarm some of the critics of the Electronics Research Center in 1963 was very clever. Colonel Gould assisted in drafting language in the bill which prohibited NASA from spending any funds on the proposed center until NASA had transmitted a detailed study to both the House and Senate committees on "the geographic location of, the need for, and the nature of, the proposed Center." The House committee cut down the request from \$5 million to \$3.9 million, and sternly warned in the committee report:

An exhaustive review of the necessity for this project by the committee revealed that the specific site had not been selected; the coordination with other Federal agencies having a like capability had not been properly effected; preliminary planning in general had not been in accordance with good management practice; and the need for the Center was not conclusively proven as essential. Consequently, the committee determined that expenditure of funds authorized for this project shall be contingent upon the result of further study by NASA.

When the NASA bill was debated on the House floor, the Electronics Research Center received no vocal support whatsoever from the majority side of the committee. Six Republicans—Roudebush, Pelly, Rumsfeld, Weaver, Gurney and Wydler—issued "Additional Views" which urged that the entire Congress, rather than the House and Senate committees, be allowed to vote on the detailed study which NASA was required to make before the funds could be released.

Wydler waded into the argument on the floor by defending the prerogative of Congress to make the final decision. He added:

I do not intend to rehash all the innuendoes of "undue influence" that have been leveled against this proposal. By this time nearly every responsible official of NASA has denied vehemently that the President's brother before last fall's election or the junior Senator from Massachusetts after the election played any part in the determination of the site selected. In fact, we are assured by the Administrator himself that the secret was kept from him for months. * * *

It is, indeed, strange that this matter which had been under consideration for 10 months was decided upon so late that it had to be inserted in the budget estimate books of NASA after the books had been originally ordered and printed. * * *

As it stands now, we are being asked to authorize \$3.9 million for this purpose and then to conduct a study to determine if some of us believe that we need it. The fact is that we may not need it at all, or we may need less, or we may need more.

To line up Democratic support, the committee report had some very critical remarks about the process used by NASA to establish the Center. The challenge was how to split the Republicans.

Chairman Miller worked out a strategy which was ingenious. First he shushed all the Democrats on the committee and advised them he didn't want any speeches on the floor by Democrats either favoring or opposing the Center. The Democrats fell in line. Knowing that the attack would be led by Wydler, and possibly joined by some Republicans, Miller's strategy was to have only one speech by any member of the committee in support of the Center, and that speech was to be given by former Speaker Martin.

When Martin arose to defend the Center on August 1, 1963, he had a vast amount of sympathy. Republicans revered him as a former Speaker and longtime leader of the party, in his final years in the House of Representatives. Democrats loved him because he was an institution, and also he was one of the most friendly and cooperative Republicans you could find. Finally, each Member of the House thoroughly understood and sympathized with Martin's approach to speak out for his area which was after all the central function of a Representative. Martin's speech was a masterpiece; he met the issue of political favoritism head on:

I am surprised that so much hysteria has been built up here concerning this suggested authorization. To my knowledge there is not as much politics in this proposal as they are trying to make out.

I never knew Senator Kennedy until after the election. But he was elected. I do know politics to a certain extent, and I am around where I hear the gossip. I do not think Senator Kennedy had the slightest thing to do with this until after he was elected Senator. Overtures might have been made, but to my knowledge there is no politics like they suggest. The allegation is a red herring being drawn to defeat the New England proposal.

I know, of course, Senator Kennedy is in favor of the Massachusetts research laboratory. If he did oppose it he would not be a Senator now, or probably would not be the next time, because any Senator or Representative must stand up for his State and work for his State when he is in office.

I do not think the Republicans opposed to the Massachusetts site are making much political hay by trying to create this issue. * * *

This Science Committee consists of a good group of men and they all know their stuff, speaking in the language of the street * * *. Let us not rebuke our own committee and take it away from them. I hope the amendment is defeated.

And so, when the Members walked down the aisle to vote by "tellers," Wydler's amendment went down to defeat by 111 to 64. Martin's support had won the day.

After all, Members of the House realized that there was a lot of clout when the President and the Speaker of the House were both from Massachusetts. Congressmen don't like to go out of their way to offend high officials with long memories.

At the close of 1963, Webb checked with Chairman Miller and Chairman Anderson of the Senate committee and got their approval

to allow Assistant Deputy Administrator George L. Simpson, Jr., to hear all the presentations by communities throughout the Nation interested in the location of the Center. NASA went through the motions, made several new studies, shuffled a great deal of paper, and lo and behold, came up with the results of a study which verified the conclusion that (surprise!) the most feasible location for the Electronics Research Center was the Boston area.

With the NASA reorganization and the establishment of the Office of Advanced Research and Technology on November 1, 1963, jurisdiction over the Electronics Research Center passed from the Karth to the Hechler subcommittee. Opponents of the Center, led by Wydler, leveled a barrage of questions at NASA witnesses in 1964. When Webb and Seamans appeared before the Hechler subcommittee, Wydler asked Chairman Hechler if he would seek access to NASA files on the choice of the Boston area for the Electronics Research Center. During the discussion, Chairman Miller entered the hearing room, and the following colloquy occurred:

Mr. HECHLER. If you care, as a full-fledged member of the subcommittee, to direct such request to Mr. Webb, you are certainly within your rights.

Mr. WYDLER. But, Mr. Chairman, you are the one who told me to wait until Mr. Webb appeared here to make the request.

Mr. HECHLER. I think that it is appropriate for you to make the request as a member of this committee now sitting.

Mr. WYDLER. I am making it to you now, Mr. Chairman.

Mr. HECHLER. I can't produce the records, Mr. Wydler. Only NASA can produce the records.

Mr. WYDLER. Will you, sir, request them for me?

Mr. HECHLER. I will be glad to try and help. Mr. Webb, I wonder if NASA could produce these—

Mr. MILLER. Before we get into this—

Mr. HECHLER. Since the chairman of the full committee, Mr. Miller, is here, Mr. Miller is recognized.

Mr. MILLER. I think this should go to the full committee.

Mr. RUMSFELD. If the gentleman would yield, perhaps Mr. Webb would say yes and solve this whole thing.

Mr. PELLY. I think the chairman of the full committee himself has a prerogative to request or not request those, and it is a determination that I would think properly he would have made by this time. It is a matter that has been presented by the committee to him. That is a matter for the chairman himself to say he will request them or not. Isn't that fair?

Mr. MILLER. I know it is your interpretation, Mr. Pelly. I have the prerogative, and until I see some reason why in the limited field in which your subcommittee must work in this, until I am convinced that there is some better reason than has been given to me, I am not going to make the request.

Mr. PELLY. I think that solves the question.

After NASA submitted its report on February 1, 1964, the full committee met in executive session on February 24. Several minority

members unsuccessfully attempted to call witnesses and hold hearings on the NASA report, and the report itself was eventually approved by an 18 to 13 vote.

The Hechler subcommittee voted to support Wydler's amendment to slash some \$12 million from NASA's \$14.5 million request for the Center. But the full committee voted 19 to 10 to reverse that decision and restore the funds for the Center. Seven Republicans—Mosher, Roudebush, Pelly, Rumsfeld, Weaver, Gurney, and Wydler—issued "Additional Views" concluding that "We do not believe it prudent or frugal to spend \$14,561,000 on the proposed Electronics Research Center this year."

Once again there was a struggle on the House floor in 1964 concerning the funding of the Electronics Research Center. For the first time, there was Democratic support voiced by Teague, Hechler, and Miller for the Center. But Teague told the House:

A year ago I had considerable doubt in my mind about this Center. I think that NASA did a very poor job in presenting the case for this Center to the Congress. I think that had they presented it the way it should have been presented, there would never have been any argument about it.

Speaker McCormack felt it necessary to make one of his rare floor speeches on behalf of the Center, opposing efforts to cut the funds. His efforts were successful, and the supporters of the full funding of the Center were victorious by 116 to 66.

But the issue was far from being out of the woods.

On July 30, 1964, the city of Cambridge, Mass., offered 29.2 acres in the Kendall Square area to NASA to constitute part of an urban renewal project. NASA accepted the offer rather hastily on August 10, 1964. The Congressman from Cambridge, Representative Thomas P. O'Neill, Jr. (Democrat of Massachusetts) then invited the Hechler subcommittee to Cambridge, where a most enjoyable two days were spent meeting with the mayor and city council, lunching with civic leaders, and getting the positives and negatives of the new site. Most of the negatives surfaced when committee members walked through the Kendall Square area, where many prospering businesses had joined together in a "Committee for Preservation of Cambridge Industry" to fight eviction through urban renewal. John J. Brennan, chairman of the Preservation Committee, sent a letter to each member of the Science Committee, vowing to take "every proper course of action legal and otherwise to stop the senseless destruction."

During Hechler subcommittee hearings in 1965, Wydler asked the following of Francis J. Sullivan, Acting Director of NASA's Electronics and Control Division:

MR. WYDLER. Is it your understanding that any site for this Center has to be within walking distance of MIT?

Mr. SULLIVAN. No, sir, it is not my understanding.

Mr. WYDLER. This selection of course is as far as you can get from Harvard, and still be close to MIT. You could not get any farther away from Harvard and be close to MIT?

Mr. SULLIVAN. There is a subway entrance at Main Street, and it is approximately a 5-minute ride to Harvard on the subway.

Mr. WYDLER. It is all right to ride to Harvard, but you have to be able to walk to MIT?

Mr. SULLIVAN. It is a good point, sir, but I think you could invert it.

Wydlер's questions were inspired by rumors that Webb had made a promise to President Kennedy. In a memorandum dated May 24, 1963, Webb related to Seamans that he had told the President "that we wished that there were some way to put it in walking distance of both Harvard and MIT."

The fight for and against the Center raged on through 1965. By a narrow rollcall vote of 15 to 13, the committee staved off an effort to require that NASA could not use any of the funds appropriated in prior years until full title had been acquired to the entire 29 acres of the Kendall Square tract. Teague contended that to require NASA to obtain title "would mean just killing the thing," and Miller added: "You are not killing it; you are just bleeding it to death."

In filing "Additional Views," the same seven Republican committee members who had opposed the Center in 1964 once again issued a blistering denunciation of the Center:

The Kendall Square site which NASA has selected is unsound, the cost is unwarranted, and acquisition problems too involved and uncertain to justify the time and expense required.

The cost of the site is prohibitive. Originally, Congress was told that NASA would spend \$3 million to acquire 1,000 acres of land, or \$3,000 an acre. Now, the Kendall Square site is estimated to cost \$3 million for less than 30 acres of land, or over \$100,000 an acre. This is more than 30 times the original estimate.

The committee action was sustained by the House on May 6, 1965, and then the conference committee restored \$5 million of the \$10 million NASA had originally asked for construction at the Center. The Center became operational in 1965, with temporary personnel occupying the buildings in Technology Square, two blocks from MIT, while the negotiations for urban renewal and planning for construction were speeding forward.

By 1966, the opposition to the Center was starting to wind down. When NASA testified in March, they could point to 387 people actually working in rented space, great progress in acquisition of property, and completion of construction plans. Special assistance in relocation allowances from the Housing and Home Finance Agency, the State of Massachusetts, and the city of Cambridge were reported at the hearings. In fact, so many developments were reported in the time frame just before the subcommittee hearings that Hechler remarked:

There is such a wonderful flurry of aggressive activity that immediately precedes each of these hearings, that perhaps we should hold the hearings more frequently.

But there was still some skepticism over whether NASA would meet the timetable outlined, as evidenced by this exchange between Roush and Boyd C. Myers, Deputy Associate Administrator for Operations:

Mr. ROUSH. Do I understand, Mr. Myers, that by the end of fiscal year 1967 you will either have spent or obligated the total sum of \$28,900,000?

Mr. MYERS. By the end of fiscal year 1967 we will have either committed or obligated almost all of that; yes, sir.

Mr. ROUSH. Well, we have had that same story every year. I'm reminded of my wife's statement to me. I keep telling her each year the Congress is going to adjourn in July or August, and I told her the same thing this year, and she said why should I believe you, you have been wrong every year so far.

A clue as to the mood of the opponents of the Center was contained in Wydler's comment to the full committee in 1966:

Although I am fully accepting the idea that the Electronics Research Center is going to be built in the Kendall Square site, I do believe that, as usual, their estimates of when they are going to be building this Electronics Research Center are totally unrealistic * * *.

The history of the interrelationships between NASA and the committee reveals a lack of candor on the part of NASA so far as the Electronics Research Center is concerned. In 1969, NASA testified that 844 employees were onboard at the Center in March. Bruce T. Lundin, Deputy Associate Administrator for Research and Technology, testified at that time:

NASA strongly believes that continued growth in the facilities and staff of the Electronics Research Center is essential to the technical strength of much of what we must do in the future.

Lundin then asked to authorize 56 additional positions and \$8,008,000 to build a new Computer/Instrumentation Research Laboratory. He remarked that construction underway was 45-percent completed. Center personnel began to move from leased space to the new building at the end of 1969.

But by 1969, a new President had taken office. In sifting through his budget priorities for the next year, it is understandable that President Nixon should have a somewhat different view of the project which had come into being under the sponsorship of the Democratic administrations immediately prior to his own.

On December 29, 1969, NASA Administrator Thomas O. Paine addressed the staff at the Cambridge Center, announced the closing of the Center, and remarked:

We are simply faced with the hard fact that NASA cannot afford to continue to invest broadly in electronics research as we have in the past.

Six buildings, representing a \$30 million investment, were in the final phases of construction at ERC. Equipment worth over \$20 million was available for distribution within NASA or disposition. Over 800 personnel were suddenly threatened with job losses. In March 1970, the ERC was transferred to the Department of Transportation and renamed the "Transportation Systems Center," with NASA getting credit for the unexpended funds in their budget.

RANGER

Project Ranger, developed by Dr. William H. Pickering's Jet Propulsion Laboratory of the California Institute of Technology, was designed to crash land on the Moon in the early 1960's to obtain close-up, high resolution television pictures of the Moon's surface during final approach.

Between 1961 and 1964, there were six failures of the Ranger to perform its mission. After the sixth failure on February 2, 1964, NASA established a special review board headed by Earl D. Hilburn, NASA's Deputy Associate Administrator for Industry Affairs, to report on the reasons for the failure and to make recommendations. In a letter to Chairman Miller on March 31, 1964, Webb reported that the Hilburn review board had found that the most likely cause of the failure was "an unscheduled turn-on of the television equipment for 67 seconds" when the booster engine was jettisoned just two minutes after launch. Webb also told Miller that the Hilburn report was classified for military security reasons and because it was an "internal investigatory document" and "since it does not represent NASA's complete judgment and final implementing plans."

Chairman Miller asked the Oversight Subcommittee to conduct an investigation of the Ranger failures. Since the Karth subcommittee had had responsibility for funding Project Ranger, Miller named Karth as acting chairman of the Oversight Subcommittee to conduct the hearings. Teague specifically recommended this move.

The membership of the Oversight Subcommittee which conducted the investigation of Ranger included the following members:

Democrats

Joseph E. Karth, Minnesota, *Acting Chairman*
 Ken Hechler, West Virginia
 Emilio Q. Daddario, Connecticut
 Bob Casey, Texas
 Joe D. Waggoner, Jr., Louisiana
 Edward J. Patten, New Jersey
 Don Fuqua, Florida

Republicans

James G. Fulton, Pennsylvania
 R. Walter Riehlman, New York
 Richard L. Roudebush, Indiana
 Alphonzo Bell, California
 Edward J. Gurney, Florida

Frank R. Hammill, Jr. staffed the Ranger hearings.

Karth immediately asked Webb for the Hilburn report and bristled when it was denied to him. The Karth subcommittee a year earlier had already been highly critical of the management problems in the relationship between NASA and the Jet Propulsion Laboratory (JPL). In 1963, when the Karth subcommittee slashed the authorization for Ranger from \$90 million down to \$65 million, Karth had observed that there were "grave doubts" about the "adequacy of the management of this project, both by NASA headquarters and the Jet Propulsion Laboratory * * *". The subcommittee feels that in view of the poor record of Ranger to date, Congress should be given reasonable assurance of success before going forward full speed with more spacecraft."

On the eve of the opening of the Karth oversight hearings, both NASA and JPL headquarters were thrown into a turmoil by differing opinions on the severity of the Hilburn report. Oran W. Nicks, NASA's Director of Lunar and Planetary Programs protested that "If the only purpose of the investigation had been to establish a basis for a critical letter to Congress, we in the program office were naively misled initially into supporting it as a constructive endeavor." Nicks wanted to forward to Congress a rebuttal of the Hilburn charges. Personnel at both the Office of Space Science and JPL were infuriated that Webb had sent Chairman Miller a summary of the Hilburn charges without giving them a chance to refute them. In an attempt to soften opposition within his own headquarters, Webb at a news conference confessed there had been an administrative error in signing the March 31 letter to Miller which he thought had been cleared in the Space Science Office.

Webb tried to deal with the revolt within his own headquarters and JPL, as well as to cope with the rising indignation of Karth who was demanding the Hilburn report. The Los Angeles Times ran an angry editorial on April 8, charging that if NASA wanted to separate JPL from Caltech, "it could do this without first resorting to a campaign of defamation, which not only damages JPL but reflects unfavorably on one of the country's very great schools of science and technology."

But Webb did not fully succeed in pacifying Karth. In a letter written for Webb's signature, but actually signed in his absence by Associate Administrator Dryden, Webb reiterated to Karth on April 22 that "the report represents the views of an internal NASA review group, but it is only one working document. It is not a definitive agency position * * *. For these reasons, the Ranger VI Report should not become a basis for either conclusion or action by the Subcommittee on NASA Oversight and should not be made available publicly."

Webb offered to bring the Hilburn report to Karth personally, with the understanding that it would not be left with the committee. In a last-ditch effort to head off or soften the sharp effects of the hearings, Webb added in his letter to Karth:

I hope you will keep in mind that the timing of these subcommittee hearings is unfortunate in that the factors of morale and program execution are both deeply involved and there are very real dangers that both may be seriously affected. Nevertheless, I can assure you that NASA officials will cooperate fully in the hearings and provide the best answers we have to your subcommittee.

When Karth opened the hearings on April 27, he read Webb's letter in its entirety. He took exception to Webb's statement that "the Ranger VI report should not become a basis for either conclusion or action by the subcommittee." Karth commented:

I think that all of the reports, or all of the investigations, regardless of who has conducted the investigation, should be a matter for this subcommittee's consideration, and could become a basis for conclusion or action by the subcommittee.

Karth also resented the statement by Webb that the timing of his subcommittee hearings was "unfortunate." He dealt with this observation with the following public statement:

I would like to point out to the members of the subcommittee and to the NASA people here represented that while Mr. Webb may feel that these subcommittee hearings are unfortunate, the action that precipitated these hearings, in all probability, are the letters addressed to * * * Chairman Miller.

I might further state that, subsequent to the Ranger VI failure, I did have an opportunity of discussing it with Chairman Miller, and that we both recognized that Ranger had had some difficulties in the past and that certain technological difficulties in a program of this magnitude were something that might be expected. For those reasons, we did not expect that the Oversight Committee would be asked to make a review of the program. However, after the Webb letter, it was hardly reasonable to expect that, with the kind of criticism contained in the letter, a congressional investigation was not in the best interests of the country and the Congress.

Hechler immediately added:

I would simply like to support the remarks made by the acting chairman of this subcommittee. It seems to me that the timing of these hearings is highly propitious, and I am certain they are going to fulfill a constructive purpose to carry out the responsibilities of Congress and of this committee.

In the comprehensive hearings which followed, the Karth subcommittee probed into relationships between NASA and JPL, and also called RCA and Northrop Corp. representatives who had worked on Ranger. During the hearings, Karth observed to Webb that "NASA is the contracting agency of the Government; (it) should be, in fact, the boss of the program. NASA provides the money, and therefore should have more to say about how this work is to be done, and by whom it should be done." Karth added that NASA, in light of the repeated Ranger failures, should have installed a strong technical team at

Pasadena "to oversee or supervise, not just management practices at JPL, but technical approaches as well."

The Karth subcommittee charged that JPL had failed to establish rigid and uniform testing and fabrication standards for the Ranger spacecraft. NASA was faulted for regarding JPL more as a field center than a contractor. The final report, which was unanimously approved by the full committee, recommended tighter NASA supervision over JPL "to manage such complex in-house projects such as Ranger and Mariner." Effective August 1, retired Air Force Maj. Gen. Alvin R. Luedecke, the General Manager of the Atomic Energy Commission, was installed as Deputy Director at JPL. General Luedecke was given responsibility for the day-to-day technical and administrative activities at JPL.

Despite the roughness of the questioning by the Karth Oversight Subcommittee, Webb was generally pleased with the outcome. In a letter to Chairman Miller dated May 4, 1964, Webb confessed to Miller that he was happy that Karth had resisted the pressure to "look for scapegoats." He also remarked that he was happy that Karth had recognized "we are dealing with an extremely delicate situation, much like walking down Fifth Avenue in your BVD's."

Rigorous testing and checkout followed the Karth investigative hearings, and there were major changes in circuitry design and hardware. In July 1964, and subsequently during February and March 1965, three highly successful Ranger missions were flown. The pictures taken just before impact resolved details of the Moon's surface less than two feet apart.

Miller and Karth both used the occasion of the Ranger successes to cement support for the program in Congress. Karth assembled foreign editorial reaction to the Ranger successes for reprinting in the Congressional Record. Chairman Miller exulted: "I want to make it crystal clear that the Jet Propulsion Laboratory is doing a splendid job."

Miller also arranged for a special briefing for Members of the House of Representatives on August 4, 1964, at which he termed Ranger "one of the greatest accomplishments that NASA has ever made."

LUNAR ORBITER AND SURVEYOR

When NASA first began to formulate its plans to investigate the Moon and the planets, primary responsibility was assigned to the Jet Propulsion Laboratory. In the early 1960's, the Surveyor was designed as a soft lander on the Moon, with one version termed a "Surveyor Orbiter." The committee closely followed the development of the Surveyor project from the time in April 1961 that NASA reported to the committee:

In January 1961, after intensive competitive design studies by four major companies, Hughes Aircraft Co. was selected to build the Surveyor spacecraft.

By 1963, NASA became concerned that JPL had its hands full trying to develop the Surveyor Lander along with Ranger and the probes to Venus and Mars being done by Project Mariner. With encouragement from the committee, the Surveyor Orbiter was transferred in mid-1963 from JPL to Langley Research Center. There it was redesigned and renamed "Lunar Orbiter" and contracted out to Boeing.

The Karth subcommittee members sharply challenged both the timing and overlap between a lunar orbiter and lunar lander during the 1963 hearings. In its committee report, sustained by the full House, the observation was made that "funds made available previously were transferred to other projects considered by NASA to have higher priority, and virtually no money has been spent on Surveyor Orbiter to date."

As was customary, NASA appealed to the Senate to get \$28.2 million restored and the conference yielded to allow \$20 million after impassioned pleas by both NASA and the scientific community. The effect of the House action was to spur NASA to define and clarify the orbiter mission and to give it the management support which had hitherto been sorely lacking.

In repeated hearings, the Karth subcommittee questioned the relationship among the three unmanned lunar missions—Ranger, Surveyor, and Lunar Orbiter, forcing NASA to pinpoint what it really planned to do, when and why. Also, the subcommittee through its rigorous questioning brought out the extent to which these programs were being funded for their scientific value, as against providing data which could assist in insuring the success of the Apollo program. The cost-conscious subcommittee also probed into issues pertaining to the Lunar Orbiter contract with Boeing, which exceeded by \$20 million the next highest bidder.

During 1966 and 1967, five Lunar Orbiters were launched and all five were successful. As a direct result of the Lunar Orbiter successes, five Apollo landing sites were certified.

In contrast to the Lunar Orbiter, the Surveyor soft lander program ran into deep trouble. The original Hughes contract called for seven flights and the price tag was \$67 million, somewhat above the announcement in a 1961 NASA press release that the Surveyor project "is expected to cost upward of \$50 million." In October 1965, when the Oversight Subcommittee submitted its report, it was concluded:

Surveyor already represents an investment by the American taxpayer of almost one-half billion dollars for the first 10 spacecraft plus launch vehicles; the ultimate cost to completion of just this first part of the project is estimated to be approximately \$725 million.

By 1965, the first launch of Surveyor had already slipped by 2½ years. The first flight actually occurred on May 30, 1966.

Once again, as with the Ranger probe, Chairman Miller authorized Oversight Subcommittee Chairman Teague to allow Karth to chair the hearings to investigate Surveyor. Karth took his subcommittee on a two-day inspection tour of the Jet Propulsion Laboratory at Pasadena, and then on to the Hughes Aircraft Co. plant in Culver City, Calif., on September 2 and 3, 1965.

The Surveyor spacecraft weighed 2,250 pounds, stood 10 feet high, and had a triangular frame with a landing leg on each of the three corners. A solid propellant retrorocket engine was designed to slow it down as it approached the Moon's surface. A television camera and a surface sampler were among the experiments aboard, enabling a measurement of the physical and chemical properties of the lunar surface to a two-foot depth under the eyes of the television camera.

The Karth hearings reviewed the stormy history of the project, involving many design modifications and bitter disputes among NASA, JPL, and Hughes. The committee found that the repeated technical difficulties had been compounded by poor management and supervision all along the line. In 1964, after NASA reviewed the shortcomings at JPL and Hughes, NASA had recommended that JPL assign more personnel to monitor Hughes. The result was an increase of JPL personnel supervising Hughes from 100 to 500, in what can only be described as "intensive surveillance" which further strained the JPL-Hughes relationship. While NASA was trying to pressure JPL to take a more aggressive supervisory role over Hughes, the Hughes organization resented the "new ideas" which slowed down their work.

The committee uncovered the fact that two "drop test" failures contributed to escalating costs. The following colloquy points up some of the multiple problems involved in the tests, the contractual relationships and the responsibility:

Mr. MOSHER. When you were talking about these Surveyor drop tests, it seemed to me there was an implied criticism when you said you found that they were not using flight quality hardware. Now, who were you criticizing at that point? Whose fault was this?

Dr. NEWELL. I think the Hughes contractor agrees that these tests weren't prepared for or conducted properly—

Mr. MOSHER. Is there any penalty here? In our contract with Hughes, is there any comeback that the Government has with Hughes in this respect?

Dr. NEWELL. We didn't have an incentive contract at that time; no.

Mr. MOSHER. This was a cost-plus arrangement?

Dr. NEWELL. Yes, cost-plus fixed fee.

Mr. CONABLE. But you are moving more toward incentive contracts, aren't you?

Dr. NEWELL. We are moving toward incentive contracts. In fact, the Office of Space Science and Applications has the largest number of such contracts in the agency, as just a means for trying to avoid this sort of problem, for getting the attention of the contractor to these things, since it affects him in the pocketbook.

Mr. MOSHER. The mistake on Hughes' part is something you necessarily write off as experience from which we can benefit next time; is that right?

Dr. NEWELL. Yes.

Mr. KARTH. Now, I assume that some of the JPL management team was also working on the problems of the drop test, or was this an exclusive thing on the part of Hughes? I am trying to pinpoint some responsibility.

Dr. NEWELL. Well, it is a responsibility we all have to share, because if we had penetrated properly into the testing program, we should have spotted this too.

The Karth subcommittee concluded that the first deficiency was NASA's failure to require sufficient preliminary design work before hardware development. Second, NASA should have stepped in and exerted firmer control over JPL sooner than it did. Third, JPL was concentrating so heavily on Ranger and Mariner that it neglected to supervise Hughes until late in the game. Of course, needless to say, Hughes top management was equally to blame.

The Surveyor investigative report ended on an optimistic note, encouraging NASA to "continue their present high level of attention to the Surveyor project."

A pleasant aftermath of the Karth hearings was the fact that from 1966 through 1968, five of the seven Surveyor shots landed successfully and performed their assigned experiments. The data from the experiments were important to the successful manned lunar landings because they substantiated the fact that the lunar surface would support landings by the Apollo astronauts.

MARINER, MARS, AND VENUS

On February 26, 1963, Dr. Homer E. Newell, NASA's Director of Space Science and Applications, briefed the committee in an informal session on the scientific results of Mariner's 36-million-mile trip to fly-by the planet Venus. Mariner was adjudged by the scientific world as a success in revealing new data on the mass, temperature, and nature of Venus. During the early 1960's, it seemed strange to committee members that Ranger had failed six times in a row to complete successful experiments a quarter of a million miles away, while a 36-million-mile shot to Venus was successful. As has been noted, Ranger snapped out of it and scored several later successes after the early failures.

Just when it seemed that Mariner's luck was going against it by a failure in 1964, Mariner IV buoyed the hope of the scientists by flying within 6,200 miles of Mars on July 14, 1965. JPL, NASA, and committee members shared the glory of a special White House ceremony in

1965, and the Karth subcommittee gave full support in 1965 to an ambitious new planetary program called *Voyager*, to make an instrumented landing on Mars.

Shortly after 10 o'clock on the morning of March 7, 1966, Karth assembled his subcommittee and staff in the smaller of the two main committee rooms, room 2325 of the Rayburn Building. It was one of those lengthy brainstorming sessions during which the committee members chewed and digested the testimony they had elicited in public hearings, and were now down to the hard decisionmaking process when they were airing their opinions in free-wheeling, off-the-cuff discussion in executive session. About an hour into the discussion, the following exchange occurred:

MR. KARTH. Could we talk about Venus for a minute?

MR. MOSHER. De Milo?

MR. KARTH. De Milo—I think the question arises on Venus, whether or not we feel the only Venus shot which is scheduled between the middle or late 1970's is a reasonably decent investment for \$30 million?

MR. MOSHER. Are you suggesting we might just as well leave Venus to the Russians for a while, and let them do the job, and work on that, and we could just ignore it for a while?

MR. KARTH. I am not suggesting anything, except maybe we discuss this thing—

MR. CONABLE. Well, the imponderable here is the prestige element, I guess. You raised this implication in your opening remarks about Venus, Mr. Chairman. There is a serious question whether we want to put ourselves in the position of simply saying, "We have no interest in Venus," and the Russians are likely to be talking about it a good deal—

MR. VIVIAN. I have a feeling the scientific community really put that Venus shot in there * * *. My feeling is if we are going to save anything, any significant fraction of that money, it has to be saved reasonably soon with a positive decision * * *. What you are saying is you would rather put enough eggs in the basket on Mars with the hopes of really doing a job on it, feeling that the peripheral data we are going to pick up on Venus is not going to be worth much.

MR. KARTH. I am saying I would like to put those extra eggs into the Mars basket without touching any other program.

Same time, same place, the same cast of characters assembled the next day, March 8, to mull over the same issue. Karth again raised the issue of Venus, and the consensus in the committee began to develop, with Mosher observing:

Well, I certainly think, Mr. Chairman, that the Venus program is one that is most expendable. It is the one we can do away with and hurt less than anyplace else.

MR. CONABLE. It certainly sounds as if we ought to make a serious effort to try to fund *Voyager* more heavily.

Karth also raised the question whether several European countries might be interested in cosponsoring the Venus shot, adding:

I had Bill Wells, my assistant, yesterday checking around to see whether or not we could make some effort to talk to the European counterparts about the possibility of their undertaking a program like this on a cooperative basis with the United

States. We came to the same stone wall that you usually come to with the State Department when you are talking about doing something in a hurry. They, I think, would be willing to explore this, but it would take them 6 months to properly explore it so they could get an answer. I don't have 6 months.

Gradually, but decisively, the subcommittee moved toward a unanimous decision. Karth personally was not disturbed that NASA and the Space Science Board of the National Academy of Sciences wanted to go ahead with the Venus probe, rather than shifting the concentration to the Mars probe. To this line of argument Karth responded:

I do not agree that we ought to leave all decisions bearing on science to the scientists, or that all political decisions should be made by politicians.

The full committee and the House supported the decision of the Karth subcommittee to concentrate on the Voyager probe to Mars rather than the Venus shot. But as so frequently happened, the decision became untracked when the scientific community mobilized behind NASA to appeal the action in the Senate, where they not only won but also reversed the House action in the conference committee. Reflecting on the turn of events, Luther J. Carter wrote in *Science* magazine that Karth "by general agreement is an intelligent and unusually hard-working committee chairman" who "has worked diligently at understanding the programs entrusted to his review." He added:

His experience illustrates the classic frustration of Congress in an era of deep Government involvement in science and technology. How does it pass judgment on highly technical programs without being either a rubberstamp or an incompetent intruder upon the affairs of experts?

Usually, the Karth subcommittee managed to cope with that dilemma extremely well, to the benefit of the taxpayers and the Nation.

The Venus fly-by took place in 1967, passing 2,600 miles from the planet, refining the temperature and atmosphere measurements made by the 1962 Mariner flight. The ambitious Voyager program was fostered and encouraged by the Karth subcommittee, but fell victim to the budget woes caused by the Vietnam war, and was mercifully put to sleep by the Senate and House Appropriations Committees in 1967. The decade ended with two Mariner shots which flew within 2,000 miles of the Martian surface and took many excellent close-up pictures of the planet.

EARTH RESOURCES TECHNOLOGY SATELLITES

In 1967, the Karth subcommittee noted in its report:

The Members uniformly support the objectives of the various space applications projects. These efforts are expected to result in tangible and measurable economic benefits to the Nation and to the world in the foreseeable future. Great strides have already been made in space meteorological and communications systems because the Congress has given generous support to these projects in the past years.

Members of the Karth subcommittee took a consistently strong position of support for the Earth resources program, which was originally named the "Earth resources survey" program.

In 1968, Karth urged NASA to be more aggressive in order to produce an early operational Earth resources satellite:

Mr. KARTH. I don't think we have to start way back at point zero with these application satellite programs as we did with Syncom, for example, because with Syncom we started without having done any previous research in an area that was applicable. I think that is not true today by virtue of the fact that we have done a great deal of research in those areas where there is direct applicability. I would think that today the time period could be shortened quite considerably if we really had an aggressive Earth resources program evolving from the agency. Would you agree?

Dr. NAUGLE. I think we should be working to shorten the time period between research and the development of the operational system, certainly. * * *

Mr. MOSHER. Then you should press forward toward it just as the chairman says.

Dr. NAUGLE. Yes.

At first, NASA witnesses balked a little when Karth suggested that the Department of the Interior and the Department of Agriculture would be pleased to receive future Earth resources data in their programs: "Haven't they brought to your attention programs that they feel would be extremely useful and save billions of dollars annually for the American people?" Dr. Naugle wondered whether the economic value of such data had been analyzed, to which Karth replied that in programs like physics and astronomy, NASA had never applied such a yardstick before proceeding with a program. With some exasperation, Karth observed:

I can't for the life of me understand how NASA, with all the brains they have, and indeed I have great respect for the intellectual capability of the people who work for NASA, is having such a hard time finding out if there is any cost effectiveness related to the Earth resources satellite program. Cost effectiveness has never been applied to any one of the other programs that I know of, and I think the most glaring example is the Apollo program itself * * *. I am just not sure I understand what is going on, but I can tell you one thing: as far as I am concerned the subcommittee is going to find out, and if there is a make-work program for the manned space flight people, chickens are going to come home to roost, if I have anything to say about it. I couldn't be any less interested in make-work or more interested in economic benefits.

Appearing before the Karth subcommittee on behalf of speedier progress by NASA in the Earth resources satellite area, Representative Fulton observed: "I believe rumor hath it that you are also dissatisfied with the progress of the program," to which Karth responded:

I think the subcommittee is more interested in the rapid development of an Earth resources satellite program than in any other program in the Office of Space Science and Applications. We feel that here is an area of immediate and widespread economic benefit which, in the long run, can do more to sell an overall space program to the public than any other program.

In arguing for passage of the NASA authorization bill in its committee report, the full committee stated:

The committee strongly believes that the prospects for economic benefits being achieved in the near future by an Earth resources satellite system are so bright as to justify increased effort in research in this area. Accordingly, NASA is urged to emphasize research and advanced studies pointing toward an early operational Earth resources satellite system.

Various Members also added emphasis in their remarks on the House floor during the May 2, 1968, debate on the authorization bill. For example, Mosher termed the Earth resources survey system "the most exciting new project on the horizon." He added:

It is expected that remote sensors in space will, in just a few years, provide valuable data on the status of our agriculture and forests, and on the location and availability of mineral and water resources; such a system will contribute to the management, utilization, and conservation of all our natural resources.

In 1969, the House, at the urging of the Karth subcommittee and the full committee, added \$10 million to the authorization for the Earth resources technology satellite program. Karth, Mosher, Symington, and other members of the Karth subcommittee led the charge to bring home to the Congress as well as the forgotten "man in the street" that this was a program which had practical applications and potential returns for the taxpayers. The subcommittee solicited support through testimony by Departments of the Interior and Agriculture officials to bolster their case. In addition, the contractors were brought in to furnish additional evidence of their ability to move forward faster if given additional support.

When Karth picked up a copy of *Space Business Daily* of March 12, 1969, he was angered to read the following note:

The head of NASA's manned space flight program said this week that the agency's unmanned Earth resources satellite program will not be rushed into development due to technical considerations, and suggested that man may play a major role in the ERS project.

Waving the article at the March 12 subcommittee hearings, Karth commented to NASA witnesses that he felt NASA's Dr. George E. Mueller was trying to hold back the Earth resources satellite development "until such time as we can use these very interesting and very desirable experiments on manned spacecraft to assist in justifying certain other manned flights." Karth, who often threatened drastic action as a means of getting fuller attention, exploded that if NASA couldn't justify its manned space flight program without this ploy, "then I am going to start saying loudly and clearly around here that we don't need a manned space flight program." He added:

This really bothers me. I can't help but feel that some place along the line we have been had, and I would hope an intelligent man like Dr. Mueller would not be so devoid of practical considerations that he would suggest what he reportedly suggested yesterday.

Karth's feeling about the manned space flight program erupted into the strong opposition he voiced against the Space Shuttle during the 1970 consideration of the NASA authorization bill. At that time, Karth led a fight to attempt to bring better balance between the manned and unmanned portions of the space program.

The strong support by the Karth subcommittee for the Earth resources program stimulated additional activity by NASA in the 1970's. The committee also continued to support both the unmanned and manned (Skylab) use of Earth resources satellites. The final meeting of the committee's Panel on Science and Technology in 1972 was devoted to "Remote Sensing of Earth Resources," once again underlining the stress which the committee placed on this useful program.

SUSTAINING UNIVERSITY PROGRAM

President Kennedy talked with NASA Administrator Webb early in his administration to urge establishment of a program to enhance scientific manpower and training facilities at the university level. NASA initiated an ambitious program which included funds for construction of facilities and laboratory space, training grants, and fellowships to increase the supply of scientists and engineers, and research funds to enable universities to support space science. Karth frequently repeated his conviction:

You can't continue to take apples out of the barrel without replenishing it, otherwise someday you're going to find an empty barrel.

In 1963, Karth's subcommittee succeeded in winning full committee support for an increase from \$30 million to \$55 million for the program. Representative Richard L. Roudebush (Republican of Indiana) attacked the increase on the floor, submitting an amendment which would hold the program at a \$30 million level. "The size of this training program and facility grants is getting completely out of hand," charged Roudebush, pointing out that NASA hoped to increase the number of students enrolled in the program from 900 in September 1963, to 1,500 in 1964, and later increase the number to 4,000. Karth responded:

I really do not think it is too much to ask that this Government invest 3 percent in brainpower to do all of the research, all of the development, all of the tests, and all of the evaluation in the various fields of research in which today we are making space history.

But when the Members walked through the teller lines, Roudebush had won the fight to cut back the program by the margin of 140 to 129. The following year (1964) when NASA asked for an increase of only \$6 million, six Republican committee members (Roudebush, Pelly, Rumsfeld, Weaver, Gurney, and Wydler) publicly expressed the hope "that the funding for this program has now leveled off and that the Congress will not be faced with requests for increased funding year by year." This time the sponsors of the program in the House had to fight the Senate's effort to cut down the sustaining university program. After a brisk argument in the conference committee, the House conferees restored the \$6 million cut by the Senate and observed in the conference report:

Any reduction would result in disruption of long-term planning, particularly in the training grants part of the program which provides 3-year predoctoral opportunities for selected graduate students at qualified universities.

The Karth subcommittee once again took the lead in protecting the \$46 million contained in the bill brought up in 1965 to extend the sustaining university program, which Karth praised during the floor debate:

Nothing is more important, in my view, than to improve the universities' role in support of the national space effort, and to increase the future supply of scientists and engineers on which the space program depends.

At the present time, about 185 universities are working on NASA-sponsored research. And 142 universities in all 50 States and the District of Columbia are now participating in the predoctoral program. Nearly 2,000 graduate students are now engaged in research and advanced training under this program, and the number will increase to more than 3,000 this fall.

Again in 1966, the Karth subcommittee took the lead in pushing this program through Congress, even though NASA reduced its request to \$41 million. The full committee supported the subcommittee's efforts, noting in its report that "The committee considers the sustaining university program an essential adjunct to the Nation's space effort." The committee chided NASA for suggesting such a small program to upgrade the laboratory facilities at the Nation's universities. But the Congress held the line and both the House and Senate supported the Karth subcommittee's recommendations in 1966.

Real trouble hit the program in 1967. NASA was forced to cut back and directed by the Budget Bureau not to spend \$10 million of the \$41 million authorized and appropriated in the calendar year 1966. Then when NASA went up before the Karth subcommittee in 1967, they were asking for only \$20 million for the following year. The subcommittee unanimously recommended that this amount be increased to \$30 million.

Representative Larry Winn, Jr. (Republican of Kansas) clashed with Representative Roudebush over the usefulness of the program during a spirited floor debate in 1967. Winn told the House:

I want to go on record as supporting the committee recommendation concerning the sustaining university program. Although I am usually one of the first to vote for cuts in our Government spending programs, I do think that we ought to take a good look at our space efforts for the future * * *. This is an important long-range program, which is badly needed to protect the billions of dollars we are pouring into the space effort. We must maintain the equilibrium of NASA by urging them to further promote research and the training of space educated young men and young women from the outstanding universities of our Nation.

Roudebush shot back:

This is tomfoolery; \$11 billion is being offered by agencies of Government this year. The appropriation is \$10 million more than the agency wants. I just regret that my colleague feels as he does.

Representative Bob Eckhardt (Democrat of Texas) took up the fight for the sustaining university program, producing letters from hundreds of educational institutions testifying as to the value of the program. Pettis, Lukens, and Mosher were among the Republicans supporting Winn's efforts to keep the \$10 million increase voted by the subcommittee, while Wydler and Rumsfeld backed Roudebush in trying to cut the authorization back to the \$20 million originally requested by NASA. Roudebush argued that 28 other Federal agencies were subsidizing education to the tune of \$11 billion a year. Karth jumped into the fray to declare:

I would submit to the gentleman from Indiana that it is brains and not brawn that has put this country ahead; it is brains and not brawn that is going to keep this country ahead if indeed it stays ahead at all.

Karth also enunciated his philosophy of the proper role of the subcommittee in considering budget requests:

Not only do I think we are here to remove, or to reduce, or to cut their budget requests, but if in our independent judgment there ought to be more money in certain projects to make them effective and to allow them to reach the objective for which they are intended then I think that we ought to take such independent action.

I have heard all too often on the floor of this House that this committee does not use that kind of independent judgment or there are not enough committees in this Congress that use sufficient independent judgment.

Fulton, who had earlier in the debate commended Winn and Eckhardt, suddenly reversed his position and sternly warned:

I believe that in no case should we go above the budget request for this type of program in this time of war.

Although Roudebush lost his amendment by a voice vote, Fulton's successful omnibus motion to recommit included the Roudebush cut

in the sustaining university program. The Fulton recommittal motion, as was mentioned in chapter VI, passed by a rollcall vote of 239-157.

In 1968 and 1969, the sustaining university program quivered and gradually expired. The Karth subcommittee supported the budget requests and Congress voted only \$10 million and \$9 million, respectively, for 1968 and 1969. So this program was still another which fell victim to the war in Vietnam. The Karth subcommittee gave the program strong support down through the years, and fought hard to keep it alive. Certainly the program thrived for a longer period with the Karth subcommittee fighting for the program's life.

APPLICATIONS TECHNOLOGY SATELLITES

Historically, the applications technology satellite grew out of a 1962 advanced Syncom study project at Hughes Aircraft Co. Following the establishment of the Communications Satellite Corp. in the early 1960's, NASA decided to reorient the advanced Syncom program away from communications research and development, in line with the efforts to turn such developments over to private enterprise. Instead, NASA developed a satellite with the broader ability to carry experiments in several different areas of technology. This led to the "advanced technological satellite" program which eventually was renamed "applications technology satellite."

From the start, the Karth subcommittee strongly supported more aggressive work in this area. As Karth told the House on May 6, 1965:

It is the development of applications satellites—spacecraft which perform meteorological, communications and navigation services—where the United States has its greatest opportunity for continuing leadership in space technology. I believe Congress should fully support this effort.

In 1968, as the ATS program began to bloom with several successful launches, Karth remarked to his colleagues:

I want to mention one other aspect of the unmanned program which I consider to be the most significant—the so-called applications satellite project * * *. NASA is continuing its important research and development of equipment for use in future communications systems with the ATS program. Closely related to this work in communications, research in navigation and traffic control techniques and equipment has already indicated that satellites can assist over-ocean aircraft and ships at sea to obtain more precise position information under all weather conditions and will some day aid in air-sea traffic control, and in coordination of emergency rescue operations.

In the 1969 hearings, the Karth subcommittee discussed what was to become the highly successful use of the ATS-6 satellite over India for communications purposes in the furtherance of education, agriculture, medicine and many other forms of communication for the assistance of the people in villages throughout India.

OTHER PROJECTS IN SPACE SCIENCE AND APPLICATIONS

In addition to the programs discussed above, the Karth subcommittee dealt with a myriad of subject-matter issues during the 1960's. The subcommittee generally supported, but rigorously examined and exercised careful oversight over the following programs:

Observatories—astronomical, solar and geophysical.

Launch vehicle procurement (Scout, Delta, Atlas-Agena, Thor-Agena, and Atlas-Centaur).

Explorers—small satellites for Earth, solar and interplanetary scientific experiments.

Sounding rockets and balloons—for vertical soundings of the atmosphere and ionosphere.

Geodetic satellites—launching and procurement of data from GEOS class satellites for geophysics and oceanography.

Biosatellites—spacecraft with recoverable capsules, to investigate biological effects of weightlessness and cosmic radiation on small animals and primates, as well as plants; also ground-based research in bioscience, and search for extraterrestrial life.

SOLIDS VERSUS LIQUIDS

Throughout the decade of the 1960's, a majority of the committee repeatedly insisted that NASA was not devoting enough effort or resources toward developing a solid rocket motor. Aerospace contractors like Thiokol and Aerojet General pressed their claims on behalf of solids. The committee was not critical of NASA's major decision to go for the use of liquids, but emphasized that NASA was overlooking a good bet by not pushing research and development of solid propellants as a parallel, but modestly funded, course of action. The advocates of a modest level of support for solid boosters generally had a majority on the committee, but they ran into a stone wall of opposition in the top management of NASA. The all-out liquid propellant advocates on the committee did not argue as vociferously; they simply didn't have to. They knew that time and NASA were on their side.

The battle over use of solids was a classic illustration of how NASA used the tactics of divide and conquer to frustrate the will of a majority of the House committee. There were two important keys to the manner in which liquids won the long battle and remained supreme in the Apollo program; first, the Senate Committee on Aeronautical and Space Sciences was never as enthusiastic in their support for solids as was the House committee; second, Dr. Wernher von Braun, the premier rocket genius of the space program, was also the No. 1 cheerleader for liquid propellants. After all, the V-2's on which von Braun had worked so successfully at Peenemünde were fueled by liquid oxygen and alcohol. And the first rocket which was fired in 1926 by Dr.

Robert H. Goddard, "the father of American rocketry," contained liquid propellants. At the same time, the Air Force and the Navy had considerable experience with solids, which powered the Minuteman and Polaris missiles.

On April 20, 1961, Chairman Brooks indicated at an open session of the committee: "Many of the committee members, as well as myself, feel that we are not taking advantage of the state-of-the-art potential of large segmented solid boosters." To supplement the testimony of advocates of the liquid propellant approach, including NASA, Chairman Brooks summoned several witnesses on behalf of solid propellants.

Representative David S. King (Democrat of Utah), wrote a strong letter to President Kennedy early in 1961, urging more emphasis on solids. The President arranged a special meeting with Webb, Secretary of Defense McNamara and Director of the Budget David Bell, at which King presented his views. King, along with Representatives Anfuso, Karth, Randall and several others, lobbied hard for an increase in committee support for solids, and they amended the authorization bill in committee to allocate \$18 million instead of \$3 million for solids. Witnesses contended that this would enable the Moon flight to take place two years earlier and for less money.

Representatives George P. Miller (Democrat of California) and Perkins Bass (Republican of New Hampshire) issued "Supplemental Views" challenging the committee majority favoring the \$15 million increase in support for solids. Miller and Bass stated:

The committee heard testimony from several industrial witnesses who represented firms that produce solid propellants and solid-fueled rockets. They testified that a rocket test engine of one million and a half-pound thrust can be produced and flight tested with adequate funding, in about 18 months. While we do not question the sincerity and honest conviction of these witnesses, it is obvious that such statements are highly subjective and are qualified by an evident motivation of self-interest.

The majority of the committee, as expressed in its report, took the position that the \$15 million increase—

will permit a rapidly stepped-up program in the development of solid propulsion fuels, an area which in the committee's judgment requires much new work if the United States is to gain leadership in space exploration.

When President Kennedy addressed the Congress and set the goal of a manned lunar landing within the decade, his May 25, 1961 address also recommended that there be parallel development of a solid booster, as well as a liquid-fueled booster. The Congress down through the years, at the initiative of the Science Committee, annually authorized and appropriated funds beyond what NASA requested, earmarked for the specific and directed purpose of research and development on the 260-inch solid booster. Despite the successful development and test-firing of the solid motor by Thiokol Corp., NASA

resisted use of solids in the Apollo program and other parts of its program. After a decade of fruitless attempts to lead the NASA horse to solids, the committee reluctantly concluded that NASA preferred to drink liquids.

In the early years of the committee's operation, Fulton regularly regaled many witnesses, and also at times bored his colleagues, with repetitive soliloquies on the virtues of boron as a propellant for space vehicles. NASA and the committee both conscientiously investigated the claims for boron, and found little evidence to recommend its use. However, these findings did not ever deter Fulton from continuing to advocate boron.

SUBCOMMITTEE MEMBERSHIP

At the start of 1967 and 1969, the following Members were assigned to the subcommittees headed by Karth and Hechler:

SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS, 1967

Democrats

Joseph E. Karth, Minnesota, *Chairman*
 Thomas N. Downing, Virginia
 Lester L. Wolff, New York
 Jack Brinkley, Georgia
 Bob Eckhardt, Texas

Republicans

Charles A. Mosher, Ohio
 Guy Vander Jagt, Michigan
 Larry Winn, Jr., Kansas
 Jerry L. Pettis, California

SUBCOMMITTEE ON SPACE SCIENCE AND APPLICATIONS, 1969

Democrats

Joseph E. Karth, Minnesota, *Chairman*
 Thomas N. Downing, Virginia
 Roy A. Taylor, North Carolina
 James W. Symington, Missouri
 Edward I. Koch, New York

Republicans

Charles A. Mosher, Ohio
 Guy Vander Jagt, Michigan
 Larry Winn, Jr., Kansas
 Lowell P. Weicker, Jr., Connecticut

SUBCOMMITTEE ON ADVANCED RESEARCH AND TECHNOLOGY, 1967

Democrats

Ken Hechler, West Virginia, *Chairman*
 J. Edward Roush, Indiana
 John W. Davis, Georgia
 William F. Ryan, New York
 George E. Brown, Jr., California

Republicans

Thomas M. Pelly, Washington
 John W. Wydler, New York
 John E. Hunt, New Jersey
 D. E. (Buz) Lukens, Ohio

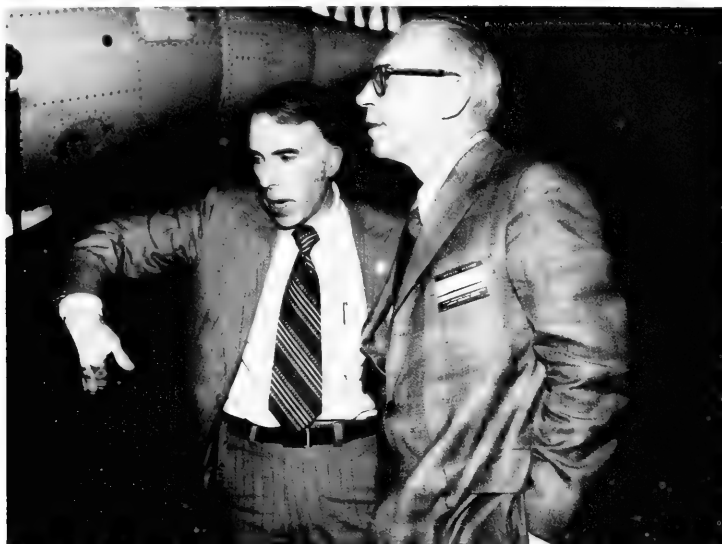
SUBCOMMITTEE ON ADVANCED RESEARCH AND TECHNOLOGY, 1969

Democrats

Ken Hechler, West Virginia, *Chairman*
John W. Davis, Georgia
George E. Brown, Jr., California
Henry Helstoski, New Jersey
Mario Biaggi, New York

Republicans

Thomas M. Pelly, Washington
John W. Wydler, New York
D. E. (Buz) Lukens, Ohio
Louis Frey, Jr., Florida



NASA's Langley Research Center Dr. Edgar M. Cortright (left) discusses with Subcommittee Chairman Ken Hechler (Democrat of West Virginia) latest developments in aeronautical research.

AERONAUTICS

The full committee, led by the bipartisan efforts of the Hechler subcommittee, every year placed greater stress and fuller funding support in NASA's work in aeronautics. Starting in 1966, Hechler, Wydler, Davis, and other Members repeatedly emphasized the fact that "the first A in NASA stands for Aeronautics," and they criticized the inadequate emphasis in this area. In 1966, for example, Hechler had this exchange with Charles W. Harper, head of the Aeronautics Division:

Mr. HECHLER. The name of the agency that you represent, Mr. Harper, is officially called the National Aeronautics and Space Administration.

Mr. HARPER. Correct.

Mr. HECHLER. Yet, Aeronautics takes up less than 1 percent of the total NASA budget. I just wonder if you ever feel slighted since you are only doing a very small part of the work of NASA. Aeronautics is a field which I think deserves far greater emphasis. Do you really think that this is an adequate amount for the Nation to spend?

Mr. HARPER. Well, I feel the Nation must first decide whether it should sponsor rapid development of aeronautics, if it is important to it. If it should, then the amount is inadequate. If our responsibility is to provide basic information which will show the direction advances can take and not the responsibility to see them incorporated, then I feel we have a good research program, and adequate to provide this type of information.

Wydler and Wolff pursued the question of the adequacy of NASA's funding for noise suppression. Harper pointed out that NASA had allocated \$3 million in 1966 as against \$2 million in the prior year for noise suppression research. Wydler then posed the question:

You are saying to put the research that you are doing and test it to see its practical application would take a program about \$20 to \$30 million a year. Is that what we are talking about?

Harper agreed, but in response to a later question by Wolff, he qualified his answer to indicate that the \$20 million "alone without some regulatory activity to force the use of sound control devices would probably not produce results very fast."

The Hechler subcommittee in 1966 unanimously voted an increase of \$2 million for the aeronautics area, with the stipulation that it be used for noise reduction, hypersonic, and vertical and short take-off-and-landing research. The committee and the Congress upheld the increase. During the floor debate, Wydler's amendment to increase aircraft noise funding by an additional \$20 million sparked a spirited interest on both sides of the aisle. On a teller vote, the amendment was defeated, 64 to 27, and on a rollcall to recommit the entire bill and include the Wydler amendment, it was defeated again 271 to 90. But the committee was clearly committed to putting more emphasis in the noise abatement area, and also in the entire field of aeronautics. Throughout the period, Wydler stressed placing a higher priority on aeronautics, particularly the reduction of aircraft noise.

In 1967, the Hechler subcommittee started a drive to upgrade aeronautics within the NASA organizational structure. Why not place



From his first term in the Congress in 1963, Representative John W. Wydler (Republican of New York), second from left, took a strong and active interest in aircraft noise research, including numerous field trips to NASA's Langley Research Center, as shown here.

aeronautics on the same level as manned space flight and other associate administrators, the subcommittee wanted to know. On May 3, 1967, NASA responded halfway in elevating Harper to become Deputy Associate Administrator of Aeronautics. Finally, on January 14, 1972, the subcommittee was victorious when NASA named Roy P. Jackson the first Associate Administrator of Aeronautics and Space Technology. The Hechler subcommittee then celebrated by taking on the new name of "Subcommittee on Aeronautics and Space Technology."

The subcommittee took the offensive again in 1967 on behalf of aeronautics. Concerned that there was insufficient leadership within NASA on behalf of aeronautics, the subcommittee called as witnesses Dr. Donald F. Hornig, Director of the Office of Science and Technology and Special Assistant to the President for Science and Technology; Secretary of Transportation Alan S. Boyd; and FAA Administrator Gen. William F. McKee. These three witnesses provided an excellent sounding board for the committee's objective. In its 1967 committee report, the following observation was made:

The committee notes with satisfaction that the aeronautics budget—including such important matters as the supersonic transport, V/STOL aircraft development, XB-70 flight research and aircraft noise reduction—is up substantially over the limited fiscal year 1967 program.

The efforts of the subcommittee were clearly effective in 1967 in stimulating increased emphasis on aeronautics. As reported to the House on June 22, 1967, Chairman Hechler observed:

The Congress has made considerable effort over the past several years to stimulate more research in aeronautics. We have authorized additional moneys and we have prodded NASA with our report language. They have responded this year by increasing their request by almost \$31 million which the committee feels is not only justifiable, but is more in keeping with the vital needs of this industry. Of specific interest to the Congress will be the amount of money allocated to improving or reducing aircraft noise. NASA is planning a research program totalling \$6.8 million. This program includes research on the aircraft engine, research on aircraft flight patterns to reduce noise around airports, and the development of a new, quieter engine which will come to fruition in about seven to eight years.

Other members continued to stress the need for more emphasis on aeronautics. Pelly told the committee in 1968:

I don't know of anything right now that is of more interest to our country, as far as economy goes, than aeronautics research.

A little over a year before Neil Armstrong first set foot on the Moon, Roush was saying:

If I were to establish a priority between aeronautics and going to the Moon, I would have to place this ahead of going to the Moon. It seems it has more practical implications, that it best serves the interests of the United States; that it best serves the economy of the United States, that it best serves our relationship with other nations; that it best serves the question of prestige.

Representative George E. Brown, Jr. (Democrat of California) also underlined the fact that NASA should be placing more stress on aeronautics, if it were to come anywhere near to the proportionate effort going into research for ground transportation.

In September and October 1968, the Hechler subcommittee held important hearings to identify the priorities needed in aeronautical research and development. In opening the hearings, Hechler commented:

The United States has always ranked at or near the top in nearly every phase of aeronautics because of the foresight which has enabled so much effort to be concentrated in advanced research. I deplore the efforts to squeeze, pare down, eliminate, or cripple advanced research in aeronautics in the name of either economy or the stress demands of very immediate practical application. If these hearings accomplish nothing else, I hope they will focus national attention on the urgency of greater emphasis on aeronautical research. We cannot afford to slow down an effort which is so vital to all the people and to the strength of the Nation itself. Whether we are talking about civil air transport, noise, air pollution, safety, congestion, or improvements in aircraft themselves—and this list is certainly not all-inclusive—we desperately need more research effort, intelligently organized and directed.

Pelly, the ranking Republican on the subcommittee, emphasized the bipartisan character of the hearings by observing:

There is, it seems to me, great danger of our overlooking the values of aeronautical research. I don't think the payoff of Federal investment in research is generally recognized. Only the engineering and scientific fraternities fully comprehend the needs and the benefits of this research effort. So I join with you today in hoping that our hearing will contribute along this line.

Edward C. Welsh, Executive Secretary of the National Aeronautics and Space Council, added his voice in support of the committee's efforts with the following excerpted comment:

I respectfully express commendation to you and your colleagues for focusing thoughtful attention on the essentiality of research and development in the field of aeronautics. The outstanding witnesses you have called for this serious examination of present and future aeronautical needs should help you perform a real public service with these hearings.

On September 24, 1968, Dr. Thomas O. Paine, who was to replace Webb as Administrator, was the leadoff witness for the aeronautical hearings. It was Paine's maiden appearance on Capitol Hill. His first words were:

Mr. Chairman and members of the subcommittee, before beginning my statement, I would like to say that it is a distinct personal pleasure for me to appear for the first time before this subcommittee which has contributed so importantly to the development and support of the Nation's and NASA's aeronautics programs.

In addition to officials from NASA, Department of Transportation (including FAA), Department of Defense and written comments by Dr. Hornig (Office of Science and Technology), the committee heard testimony from two former FAA Administrators (Generals McKee and Quesada), the Air Line Pilots Association, Aircraft Owners and Pilots Association, Aerospace Industries Association, Professional Air Traffic Controllers Organization, Air Transport Association and officials of four major airlines, the National Air Carrier Association, and the Flight Safety Foundation.

A little over a year later, at the end of November 1969, Hechler phoned William A. Anders, Executive Secretary of the National Aeronautics and Space Council. Anders, who had been lunar module pilot for the historic Apollo 8 Christmas trip around the Moon in 1968, had been aboard shortly over two months in his new position. Anders invited Hechler to dinner and over London broil and later on into the night in Anders' office in the Executive Office Building, they mulled over what could be done to move the Nation's aeronautics program forward. Hechler then invited Anders to be the leadoff witness in a new set of subcommittee hearings starting December 1, 1969. The hearings were a continuation and updating of the very provocative hearings held in the fall of 1968 on the same subject. In opening the 1969 hearings, Hechler noted:

The Committee on Science and Astronautics, almost since its inception, has strongly advocated the utilization of our advanced research resources to provide for the contingencies in aeronautics and aviation as best they could be predicted. This subcommittee, year after year, during the hearings on NASA authorizations, has obtained the approval of the full committee for increased funding of NASA's aeronautical research program. It is thoroughly recognized that the leadership and prestige this Nation now enjoys in aviation is seriously threatened by operating conditions rapidly becoming intolerable, not to overlook the growing competence of our international competitors.

This was the first appearance as a witness on Capitol Hill which Anders was making in his new job, and at first he was somewhat reluctant to appear. But after laying some groundwork in the Executive Office of the President, the former astronaut appreciated that he could help make a real contribution toward emphasizing aeronautics at the Presidential level.

Anders opened his remarks by noting:

It is appropriate that this first appearance of mine deals with aeronautics since, as I have mentioned several times in conversations with you, Mr. Chairman, I intend to insure that the responsibilities in aeronautics that have been assigned to the Council and its staff are not neglected.

Anders mentioned that he had beefed up his immediate staff "with aeronautical specialists." He mentioned that he planned to take a more active role on behalf of the Council in coordinating aeronautics research and development policy, as well as to add input to the on-going study being jointly prepared by NASA and the Department of Defense. In one of his opening questions, Hechler asked Anders:

How were you able to get up to the Moon so successfully when now we are unable to solve a lot of these aeronautical problems of a more mundane nature?

Anders answered:

The problem of landing on the Moon really is kind of a simple one. The President stated his requirement. He gave the job to the engineers * * * Congress got behind them and provided the funds to do the job. This is mainly a technical job. The problem we are talking about today, aeronautics, is a technical one, but it is also a "people" problem. It reminds me of Dr. von Braun's comment when asked that same question. He said it reminded him of a situation at a large dinner party, where he knew where he was, he knew where his seat was, but it was always so difficult to get there because there were so many people in the way.

In addition to witnesses from NASA, the Department of Transportation (including FAA), and the Department of Defense, the subcommittee heard from former NASA official Dr. Raymond L. Bisplinghoff in his new capacity as Chairman of the Aeronautical and Space Engineering Board of the National Academy of Engineering, and officials of General Electric Co., McDonnell Douglas Corp., and the

Boeing Co., as well as Secretary of the Air Force (and former NASA Deputy Administrator) Dr. Robert C. Seamans, Jr. NASA Administrator Dr. Thomas O. Paine acknowledged in his testimony:

We at NASA fully appreciate the role that the Committee on Science and Astronautics has consistently played in emphasizing the need for farsighted programs in aeronautical research and development. The committee and particularly this subcommittee have been a moving force in gaining support for the steady increase in funding within NASA for aeronautics over the last few years.

During the hearings, Representative Barry Goldwater, Jr. (Republican of California) raised two points concerning gaps in aeronautical research: the need to train more young aeronautical engineers, and the need to place more emphasis on research in general aviation safety.

The 1969 hearings on aeronautics led to the publication of a committee report entitled "Issues and Directions for Aeronautical Research and Development", produced by the subcommittee and printed on March 23, 1970. The report was largely the work of William G. Wells, Jr. who accomplished yeoman work in the area of aeronautics. Wells, who worked closely with the committee while a staff assistant to Representative Karth from 1965 to 1969, holds degrees from the University of Chicago, Purdue University, and a D.B.A. degree from George Washington University. As a Colonel in the Air Force and later with NASA, Wells had extensive experience in missile development and program-writing in the space field. His expertise was still being utilized in 1979 as Staff Director of the Subcommittee on Science, Research and Technology until his resignation in October.

To summarize, the 1970 report on aeronautics emphasized the following points:

Our Nation should establish a national aeronautics and aviation policy.

Federal agency-industry roles and relationships require clarification.

Department of Transportation should be represented on the National Aeronautics and Space Council.

Our long term world leadership is in danger if aeronautical research and development continue to decline.

We must rebuild our technological base, and also use our existing technology more fruitfully.

Positive action needed by both Government and industry to attract more younger scientific and technical personnel into aeronautics.

Airports must be considered among needs to be filled in the aeronautical research and development area.

NERVA AND NUCLEAR POWER

Many battles raged within the Congress over the issue of whether or not to develop nuclear rockets, as well as on-board nuclear space power. The biggest fights occurred over the Nerva (Nuclear Engine for

Rocket Vehicle Applications) and Snap (Systems for Nuclear Auxiliary Power), most particularly Nerva.

Nerva followed a course of development much akin to the Electronics Research Center: Funding was strongly supported at the start by NASA, bitterly opposed by a minority in the Congress and a strong minority in the Science Committee, and finally the rug was pulled out by NASA under the pressure of budgetary restrictions.

In the early sixties, there wasn't too much opposition to the funding of Nerva or nuclear on-board power. The committee generally supported what NASA recommended in these areas. The programs were conducted jointly by NASA and the Atomic Energy Commission, and the coordination was made smoother by a Joint NASA-AEC office called the Space Nuclear Propulsion Office. When Senator Anderson became chairman of the Senate Space Committee in 1963, he regarded all nuclear programs as his "babies" and took good care to protect them and feed them adequately. The location of Los Alamos in New Mexico helped persuade Senator Anderson to support nuclear programs even more strongly.

The first rumbling of discontent and disagreement between NASA and the committee came in 1965, when the Bureau of the Budget decided to discontinue further funding of the Snap-8 on-board nuclear power development. The House committee, supported by the House, disagreed and put in \$6 million to continue the development. At the same time, the "nuclear hawks"—Fulton and Bell—issued a separate report urging greater effort in the whole area of nuclear propulsion research in order "to insure our preeminence and security in the space field."

A bipartisan team of Wydler and Ryan led the fight within the subcommittee against any further funding of the Nerva nuclear rocket. Their opposition suddenly erupted in 1967, primarily because it became apparent that Nerva was being planned by NASA for any manned expedition beyond the Moon to Mars. The opponents argued that the \$47 million specifically requested for Nerva in 1967—much of which had been sent to Capitol Hill in a late supplement to the President's January budget—would cost \$1.5 billion over a 10-year period, plus more later if and when a mission were chosen. Schedule delays, cost overruns and technical problems also fueled the arguments of Nerva's opponents. The proponents of Nerva pointed out that lack of a nuclear rocket in the future would foreclose the picking of missions to the planets or lifting large payloads in Earth orbit.

Chairman Miller, Bell, Hechler, Davis, Fulton, and Pettis spoke for Nerva. The vote was a close one, with Nerva surviving a 121-91 teller vote. But then Fulton offered his surprise motion to recommit.

Despite the fact that he had previously spoken out in favor of Nerva, his recommit motion slashed the nuclear rocket program by some \$24 million.

Senator Anderson, that perennial friend of nuclear development, helped the conference committee to restore the full amount of Nerva in 1967. But the Appropriations Subcommittee hit the program on the blind side and forced NASA to scale down its Nerva program from a nuclear rocket with 200,000 pounds thrust to one with only 75,000 pounds thrust.

The same cast of characters marched out to do battle in 1968. This time the Hechler subcommittee, supported by the full committee and the House, refused to fund Nerva, but once again Senator Anderson and his power in the conference committee prevailed. Pelly and Rumsfeld joined the opponents of Nerva. The House and Senate Appropriations Committees, while cutting NASA's total budget, expressed the opinion that there was enough flexibility for NASA to go ahead with the smaller Nerva rocket motor if they really wanted to.

The House had a strange reversal of feeling as the decade drew to a close. In 1969, NASA asked for \$36.5 million for nuclear rockets, and this time the House voted \$13.5 million more than was requested in order to speed up Nerva. It was argued that Nerva would be cheaper for post-Apollo missions. On the committee, Wydler opposed the \$13.5 million increase, but muted his objections to the amount NASA requested. Representative Edward I. Koch (Democrat of New York), later to become mayor of New York, was the only committee member to make an all-out fight against Nerva in 1969.

In 1971, the House and Senate Appropriations Committees finally killed Nerva, by denying further funds. And when Senator Anderson retired from the Senate in 1972, Nerva lost its last big clout on Capitol Hill.

UNIDENTIFIED FLYING OBJECTS

As noted in chapter I, the Select Committee on Astronautics and Space Exploration had conducted a subcommittee hearing on unidentified flying objects. No conclusions were reached, and testimony was confined to an Air Force presentation on material assembled on sightings, plus explanations of phenomena where available.

The successive chairmen of the Science and Astronautics and Science and Technology committees were all reluctant to authorize full-blown inquiries into unidentified flying objects, on the grounds that the jurisdiction of the committee did not warrant coverage of the issue. Perhaps the real reason for the reluctance of the committee to grapple directly with the subject was the feeling that this was a "hot potato"

which might consume an inordinate amount of time, plus focusing undue attention on the "UFO buffs" who might unduly divert the committee from more important missions.

Representative J. Edward Roush (Democrat of Indiana) was the most outspoken advocate on the committee who supported the need for public hearings. Chairman Brooks, who sanctioned committee inquiries on a wide variety of subjects, drew the line against any investigation of UFO's because he feared that such a hearing would bring public ridicule against the committee. Chairman Miller also declined to sanction any UFO inquiry on the grounds that the subject properly belonged within the jurisdiction of the Air Force and the Armed Services Committee. Congressman Roush bided his time, bringing up the issue casually on a number of occasions, realizing that gentle prodding and compromise worked better with Chairman Miller than direct confrontations. Finally in 1968 Roush worked out a formula which met Miller's approval: Roush offered to chair a one-man "Symposium" which would appear to be something less than a formal committee hearing. Roush agreed to limit the meeting to one day, to allow only bona fide scientists to testify, not to set up a special subcommittee for the purpose, and not to issue any kind of official report of the proceedings other than the text of the recorded symposium itself.

Six participants all accepted invitations and appeared at the symposium on July 29, 1968: Dr. James E. McDonald, Institute of Atmospheric Physics, University of Arizona; Dr. J. Allen Hynek, head of Department of Astronomy, Northwestern University; Dr. Robert L. Hall, head of Department of Sociology, University of Illinois at Chicago; Dr. Robert M. L. Baker, Jr., senior scientist, Computer Sciences Corp.; Dr. James A. Harder, associate professor of civil engineering, University of California at Berkeley; and Dr. Carl Sagan, Department of Astronomy, Cornell University. In addition, prepared papers were presented by Dr. Donald H. Menzel, Harvard College Observatory; Dr. R. Leo Sprinkle, Division of Counseling and Testing, University of Wyoming; Dr. Garry C. Henderson, senior research scientist, space sciences, General Dynamics, Fort Worth, Tex.; Dr. Stanton T. Friedman, Westinghouse Astronuclear Laboratory; Dr. Roger N. Shepard, Department of Psychology, Stanford University; and Dr. Frank B. Salisbury, head, Plant Science Department, Utah State University.

In opening the Symposium, Representative Roush declared:

We approach the question of unidentified flying objects as purely a scientific problem, one of unanswered questions. Certainly the rigid and exacting discipline of science should be marshaled to explore the nature of phenomena which reliable citizens continue to report.

A significant part of the problem has been that the sightings reported have not been accompanied by so-called hardware or materials that could be investigated and analyzed. So we are left with hypotheses about the nature of the UFO's. These hypotheses range from the conclusion that they are purely psychological phenomena, that is, some kind of hallucinatory phenomena; to that of some kind of natural physical phenomena; to that of advanced technological machinery manned by some kind of intelligence, that is, the extraterrestrial hypothesis.

We take no stand on these matters. Indeed, we are here today to listen to their assessment of the nature of the problem; to any tentative conclusions or suggestions they might offer, so that our judgments and our actions might be based on reliable and expert information. We are here to listen and to learn.

Chairman Miller, in welcoming the participants to the symposium, took great pains to underline his apprehension:

I want to point out that your presence here is not a challenge to the work that is being done by the Air Force, a particular agency that has to deal with this subject. * * * I want you to know that we are in no way trying to go into the field that is theirs by law, and thus we are not critical of what the Air Force is doing. We should look at the problem from every angle, and we are here in that respect. I just want to point out we are not here to criticize the actions of the Air Force.

In general, those who testified recommended that UFO sightings merited scientific study, rather than ridicule. One committee member, Representative Jerry L. Pettis (Republican of California), an experienced pilot, indicated that a number of his fellow pilots had observed unusual phenomena caused by "UFO's" which they had been reluctant to report for fear of being exposed to ridicule.

At one point, Representative Roush asked Dr. Sagan whether he believed in extraterrestrial life, and Dr. Sagan responded:

Congressman Roush, I have enough difficulty trying to determine if there is intelligent life on Earth, to be sure if there is intelligent life anywhere else.

One witness, Dr. Baker, stated his preference for the term "anomalous observational phenomena" rather than "unidentified flying objects." When Roush protested that his Hoosier constituents might not cotton to the lengthy new characterization, and would prefer the term "UFO," Dr. Baker insisted that his new phrase "comes trippingly off the tongue" and the phenomena could be labeled "AOP's."

The symposium continued until after 4:30 p.m. on July 29 before adjourning. As indicated, no report or conclusions were issued on behalf of the committee, and no further action was taken on the subject.

TRACKING AND DATA ACQUISITION

In the period from the creation of NASA to the end of the 1960 decade, close to \$1 billion was spent on building and operating the tracking networks and acquiring the almost endless flow of data which spewed forth from manned and unmanned missions, and many far out

projects tracked through the deep space network. Spacecraft tracking, data telemetry, spacecraft command, voice communication, and television all figured in these efforts.

Early in the development of the tracking networks, the committee encouraged closer cooperation with the tracking efforts of the Department of Defense, as well as the establishment of cooperative relationships with foreign countries and tracking facilities with the know-how and reputation of Jodrell Bank in England. A visit by several committee members to Jodrell Bank early in the program helped cement these relationships, and avoid some of the duplication which otherwise would have arisen.

A good example of how the committee influenced NASA policy, improved coordination with the Department of Defense, saved money for the taxpayers, and instilled a greater measure of common sense into a program occurred in 1963. For several days, the Hechler subcommittee meticulously examined, dollar by dollar, the requested expenditures for tracking and data acquisition. Chairman Miller, visiting the hearings, made some observations on the process:

Chairman MILLER. Mr. Chairman, may I say to the committee on those things, we are meeting here, authorizing money which is the upper limit that can be spent. Before any of this money is spent, it has to be appropriated. This is one of the functions of the Committee on Appropriations to determine whether or not \$3 million or \$1½ million or \$24 million or \$5 million will be immediately spent for this. This is the upper limit for the thing. Let's not confuse the fact that we are an authorizing committee and not an appropriations committee.

Mr. ROUSH. Thank you, Mr. Chairman.

Mr. RUMSFELD. I think that is a good point. However, recently the House considered an authorization bill, and each item was approved by the legislative committee exactly as requested with, in my opinion, insufficient discussion. I think it would be of great value to the members of the appropriations committee if these matters were gone over in some detail by the authorizing committee.

Chairman MILLER. I may say to the gentleman that I think this committee has gone over these items from time to time since it has received this authority with much greater care and skill than any other authorizing committee and there are only two in the Congress. We still have the matter of appropriating the money for these.

Now no one wants to cut you off or interfere with your right to investigate any of these items, but I just point this out to you, that in this field particularly and in the whole field in which we deal, it is almost highly impossible to predicate today what you are going to spend 18 months or a year from now or to get definitive information. * * *

Mr. HECHLER. Mr. Chairman, I have never seen as energetic or broad a committee chairman as would come to take such an interest in what a subcommittee is doing. We certainly appreciate it, Mr. Chairman.

Chairman MILLER. Whenever I say that I want the new members to know that it is in no criticism. I want them to satisfy themselves because that is the only way we can get the basis on which the committee operates.

Mr. HECHLER. Let me complete my thought. I appreciate serving with a subcommittee here which is as energetic and thorough in its work, also.

Mr. RUMSFELD. Well, I would say that this has certainly been the chairman's policy, as well as the chairman of the subcommittee, since I have been on the committee, which amounts to just a few weeks now, and I certainly appreciate it.

The following day, NASA was besieged with a barrage of questions concerning \$90 million NASA asked to modify three ships for NASA's exclusive use in the Apollo program. Roush, Wydler, Hechler, Rumsfeld, Fulton of Tennessee, and other members of the subcommittee raised the warning flag that they objected to the concept that NASA seemed to want its own Navy. NASA insisted they had negotiated over a year with the Department of Defense, and could not conclude an arrangement which would give them the instrumentation ships on short notice when they needed them for the critical tracking missions required by the Apollo program. The subcommittee directed NASA to send a new letter to the Department of Defense, with specifications for the ships, and then called Assistant Secretary of Defense John H. Rubel before the subcommittee to clarify the fact that Defense could offer a satisfactory arrangement to NASA for \$10 million less than NASA was proposing. Also, for \$80 million, the Defense Department indicated it could supply five ships instead of the three initially requested by NASA, at an annual operating cost of \$4.5 million less than NASA estimated.

The House conferees on the authorization bill then threw the whole problem into the laps of the conference committee which met in the waning days of August 1963. NASA persuaded the Senate conferees to give them a little more than \$80 million, but the House conferees won the fight to require some tough language on coordination. In exchange for raising the authorization to \$83.3 million, the House conferees persuaded the conference to stipulate that none of the funds could be obligated until a joint NASA-DOD study had been completed by January 1964, "that would result in a pooling of tracking ship resources." The conference backed up the subcommittee position 100 percent, and further required that priority for the use of the ships by NASA should be given to NASA, but that DOD should have responsibility for navigating and operating the ships under regulations jointly negotiated by NASA and DOD.

Following up the victory by the subcommittee, Chairman Miller dispatched a letter to Vice President Johnson asking him to take the initiative to crack some heads together, through the Space Council, to get some coordination. The fur began to fly. The Council rode herd on NASA and DOD to get them to give a high priority to the joint study. Within NASA, Retired Navy Adm. W. Fred Boone, head of the NASA Office of Defense Affairs, took central responsibility to move the study forward.

Admiral Boone reported that the negotiations "were long and at times contentious." But an agreed-upon solution met the congressional deadline of January 1964, and coordination was achieved. The committee decided to stay out of the argument over what to name the new ships. The Secretary of the Navy wanted to name them after cities which had little to do with the space program. Admiral Boone suggested that since two ships had already been named after Air Force generals Arnold and Vandenberg that it would be appropriate to name the new instrumentation ships the James E. Webb, Hugh L. Dryden, and Robert C. Seamans who, according to Admiral Boone were "the three men most responsible for the Apollo program." This was promptly vetoed by Webb, and the ships were named instead the Redstone, Vanguard, and Mercury, three names prominently associated with the early days of the space program.

Coordination, cost saving, and rigorous oversight were high on the list of committee priorities.

This philosophy dominated the efforts of the Hechler subcommittee to insure that building and equipping the network were accomplished at the lowest possible cost. As Representative Roush told the House in 1964:

The committee has emphasized to NASA that, insofar as possible, the equipment and facilities authorized for the tracking network must serve all users to the maximum feasible extent. The placement of tracking stations should include consideration of the future space network requirements of the Department of Defense as well as NASA.

In 1965, the committee discovered that NASA wanted to purchase 40 acres of land for a tracking station at Antigua at a cost of \$5,000 per acre. The committee asked the Corps of Engineers to examine the availability of other land, and directed that NASA look into working out cooperative arrangements with the Air Force or negotiate for land owned by the British crown. Roush initiated an inquiry which established the fact that because of agreements with Great Britain, crown lands could be obtained rent free. This information was forwarded to NASA, and NASA proceeded to select a new site on crown land, thus saving the taxpayers the purchase price of private land on Antigua. Furthermore, cooperative arrangements were worked out so that the Air Force provided ground support for the Antigua tracking station.

Working with the tracking and data acquisition program was a very complex business for members of the committee. Those in the business had an esoteric language which was difficult to comprehend. Even when committee members made inspection trips to view and ask questions about the tracking network, it was a different world where computers and tapes whirled and mathematical formulae seemed so complex as to defy any layman. Addressing tracking network personnel on March 18, 1972, Neil Armstrong said:

To those of you out there on the network who made all of the electrons go to the right places, at the right time—and not only during Apollo XI—I would like to say thank you.

Teague and Mosher both put it more succinctly. In separate statements at different times, they commented that those involved in the tracking and data acquisition program were "the unsung heroes of our space program."

FOR THE BENEFIT OF ALL MANKIND

If there were one theme which dominated the committee's thinking in relation to the entire space program, it was the strong determination that practical applications growing out of NASA's work should be made available quickly and effectively to American industry and consumers. The very first sentence in the National Aeronautics and Space Act of 1958 stipulates:

The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

On July 5, 1960, the committee published its first report on "The Practical Values of Space Exploration." It became one of the most popular publications the committee produced, and it was reproduced by the thousands under different titles such as "For the Benefit of All Mankind."

Organizationally, NASA seemed almost determined to hide or down-grade many of its efforts on behalf of the average man in the street. The Space Act also provided, and NASA was directed to—provide for the widest practicable and appropriate dissemination of information concerning its activities and the results thereof.

To the distress of committee members, NASA seemed to overlook some of the obvious opportunities to tell the world that going to the Moon meant something far more to the American people than bringing back a load of Moon rocks.

Press releases and brochures were available through the NASA Public Information Office to send to those who asked, and by far the greatest number of inquiries came from school pupils. But it took the initiative of the committee to produce and distribute the publication on "The Practical Values of Space Exploration," a chore which NASA shunned for many years.

When Morton J. Stoller, Director of the Office of Applications, testified before the Hechler subcommittee on March 5, 1962, the bulk of his testimony was devoted to weather and communications satellites—two areas which clearly were devoted to practical applications, and which throughout the committee's history received strong support from the Congress. Included in a statement which ran 32

printed pages, which Hechler said had "broken all records for a massive statement before the committee," Stoller devoted a fleeting quarter of a page to what he termed "industrial applications." In terms which could hardly be termed ringingly enthusiastic, Stoller mumbled:

Many industrial firms normally will not be exposed to the new developments in space technology in the course of their routine operations. However, NASA's program will be generating much in the way of new technical capability which all commercial organizations should have an opportunity to evaluate and use.

Many committee members continued to pressure NASA to take a more aggressive role in making space benefits available to both industrial and other users. As a result, in 1963, Dr. Seamans announced to the subcommittee that Dr. George L. Simpson had been named Assistant Administrator for Technology Utilization and Policy Planning with a responsibility for public information, data storage and retrieval, educational programs and industrial applications. Simpson himself was a good public relations man, and he pleased the committee with his opening statement:

NASA is committed to a hard-driving effort to transfer the useful fruits of our research and development effort to the private sector of the economy in as quick and as useful a way as possible.

Although the subcommittee and full committee, supported by the House, annually attempted to raise the authorization for technology utilization, Congress never seemed to be able to instill in NASA the same enthusiasm which the committee felt for the value of the program. At a time in the midsixties when NASA's total expenditures soared over \$5 billion, NASA was still budgeting only \$5 million—less than one-tenth of 1 percent of the total budget—to technology utilization. The committee also found it very distressing that the average Administrator of Technology Utilization stayed in office about one year.

Despite these handicaps, the technology utilization program began turning out a vast number of "Tech Briefs" to alert industrial users of available products developed through the space program—products like aluminized mylar, developed originally as reflectors for satellites, used for jackets, parkas, blankets and sleeping bags; a lightweight fireman's air tank and breathing system based on technology developed for astronauts' equipment; tiny television transmitters which could be swallowed in a capsule and used to examine the stomach; and exotic lubricants developed to withstand extreme temperatures on the Moon.

With the reorganization of NASA and the subcommittees in 1963, the Karth subcommittee took over weather and communications satellites, as well as applications technology and other forms of satellites, while the Hechler subcommittee retained authorization authority over technology utilization. As noted, the Karth subcommittee continued to stress the superior investment opportunities in applications such as the Earth resources technology satellites. Chairman Miller and the subcommittee chairmen led the fight to persuade NASA to place greater emphasis in areas understood, appreciated and utilized by the public.

At the close of the decade, Representative Lou Frey, Jr. (Republican of Florida) began a renewed campaign, supported by all members of the committee, to focus more attention on the practical benefits of the space program. As Frey stated in his views appended to the 1969 committee authorization report:

First, increased steps must be taken by NASA to insure that a "payoff" orientation is present in all NASA planning for the future. Second, greater efforts must be made by NASA to transfer the scientific knowledge and technology from the space program to other phases of our life. Third, the citizens of this country who pay hard-earned dollars for this program must be shown by example and through non-technical language that they are receiving their money's worth, which they certainly deserve.

The committee pointed out countless other examples of practical benefits first developed in the space program, from the use of lasers in eye surgery to the home use of fuel cells, fire-resistant clothing and home furnishings, and the grooving of highways to prevent hydroplaning accidents. The electronic pacer, rechargeable from the outside, need now be implanted in the chest only once to give a new heart to the afflicted. The remarkable "sight switch," developed for activating switches in a spacecraft by a mere movement of the astronaut's eye, has been adapted to aid paralyzed people, and has been demonstrated before the Science Committee. Just as space scientists have used digital computers to clarify pictures televised from spacecraft, so is the same technique used to clarify and sharpen medical X-rays. Railroad tank cars, weighing half as much as steel cars, are being produced from the light-weight plastics developed for NASA for use in its rockets.

As the committee reached the end of the decade of the 1960's, the immediate goal of the lunar landing had been realized. Yet the corrosive influence of the Vietnamese war, as it did in every phase of American life, deeply affected the future of the committee's work.

In the 1970's, new blood energized the committee and its outlook. In 1975, a totally new challenge faced the committee as the Congress expanded its jurisdiction to cover research and development in non-nuclear energy and many other nonmilitary areas, including civil aviation, environmental research and development and the National Weather Service. In 1977, following the termination of the Atomic Energy Commission and the Joint Committee on Atomic Energy, the Science Committee also was given jurisdiction over nuclear energy research and development.

These and other challenges, and how the Science Committee met them, are discussed in subsequent chapters.



Dr. William H. Pickering (center), Director of NASA's Jet Propulsion Laboratory, with Representatives James D. Weaver (Republican of Pennsylvania), left, and Joseph E. Karth (Democrat of Minnesota), right.



Committee personalities of the 1960s:
From left, Representatives Guy Vander Jagt
(Republican of Michigan), Bob Eckhardt
(Democrat of Texas), and Jerry L. Pettis
(Republican of California).



Representative William J. Randall (Demo-
crat of Missouri).



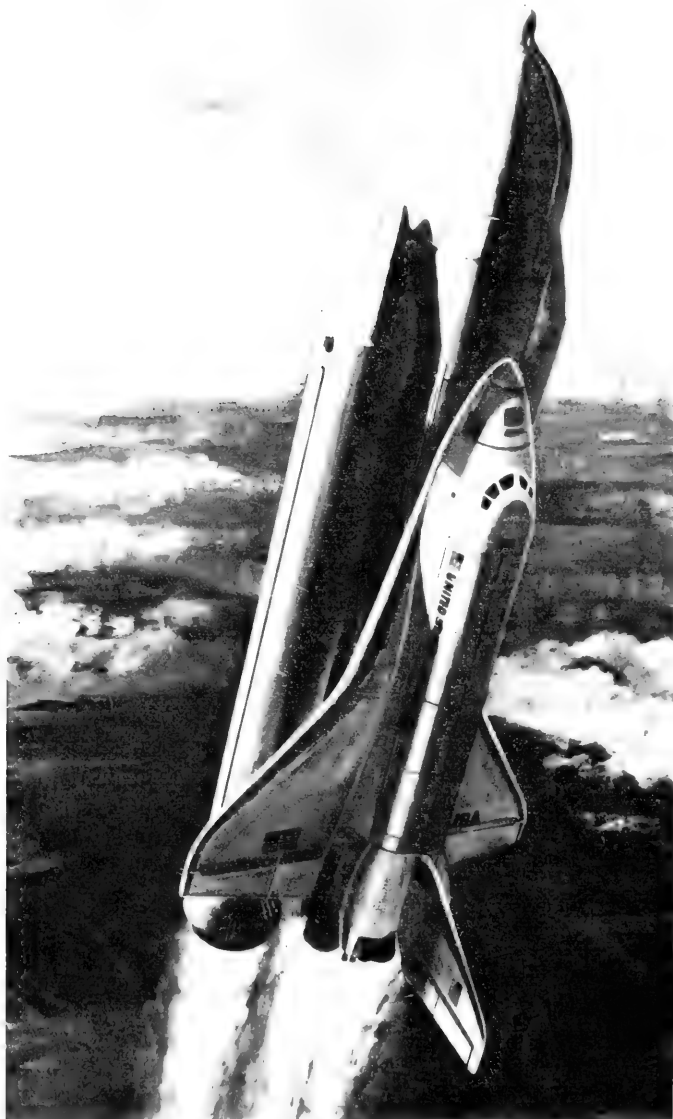
Representative Thomas M. Pelly (Repub-
lican of Washington).



Representative William Fitts Ryan (Demo-
crat of New York).



Representative John E. Hunt (Republican
of New Jersey).



Artist's conception of the first Shuttle flight.

CHAPTER VIII

Decision on the Space Shuttle

As the 1970's dawned, it was the worst of times for the space program.

The high drama of the first landing on the Moon was over. The players and stagehands stood around waiting for more curtain calls, but the audience drifted away. Five more successful Apollo flights to the Moon brought back valuable data far beyond the original expectations of the scientific community. But to many voters and taxpayers they were anticlimactic. The Nation sweated out the safe return of the Apollo 13 astronauts after an oxygen tank ruptured and aborted their mission, yet the brief and emotional concentration on the accident in space did not rally broad-based national support for expansion of the space program.

The bloody carnage in Vietnam, the plight of the cities, the revolt on the campuses, the monetary woes of budget deficits and inflation, plus a widespread determination to reorder priorities pushed the manned space effort lower in national support.

SHOULD WE LAND ON MARS?

Ignoring the storm signals, Vice President Spiro T. Agnew tried to copy what President Kennedy had accomplished in 1961. In a nationwide television interview at Cape Kennedy just before the launch of Apollo 11 to the Moon, Agnew called for "a manned flight to Mars by the end of this century." Unlike the enthusiastic response to the Moon goal by the Committee on Science and Astronautics in 1961, the idea of a Mars mission was greeted by a cold shoulder in Congress.

Chairman Miller, in an address to the House on August 11, 1969, bluntly stated: "I do not at this time wish to commit ourselves to a specific time period for setting sail for Mars." Teague, as Chairman of the Manned Space Flight Subcommittee, also shied away from supporting a manned flight to Mars. When Vice President Agnew, as Chairman of a Presidentially appointed Space Task Group charged

with outlining future goals, asked Teague for his views, Teague responded:

I know of one major contribution that can be made. That is the development of space vehicles that can be used repeatedly, with basic characteristics in common with transport aircraft. In view of the potential in this area, I believe the reusable space transport should stand very high on our list of priorities.

It was not a new idea for Teague. As early as 1966, in a report of the Subcommittee on NASA Oversight which he chaired, entitled "Future National Space Objectives," Teague had included this recommendation:

Immediate planning for a new generation of spacecraft capable of recovery at low cost and which are ground recoverable is a requisite to attaining lower total mission cost.

SPACE TASK GROUP RECOMMENDATIONS

The Space Task Group, chaired by the Vice President, included Dr. Lee A. DuBridge, Science Adviser to the President; NASA Administrator Thomas O. Paine; and Secretary of the Air Force and former NASA Deputy Administrator Robert C. Seamans, Jr. Reporting to the President in September 1969, the Space Task Group presented a smorgasbord of manned and unmanned space projects, with a series of options which virtually afforded the opportunity to move in almost any direction at varying speeds. Throwing in everything but the kitchen sink, the Space Task Group did mention that through concentrated effort, a manned mission to Mars would be possible by 1981.

Without congressional or public support for such a mission, the Mars project appeared doomed. Some committee members, notably Representative Thomas N. Downing (Democrat of Virginia) mentioned that if the unmanned probes to Mars confirmed the possible existence of life on the red planet, "then it was an entirely new ball game" and a manned mission would receive strong support. As no such evidence developed, congressional support for a manned Mars mission collapsed and attention was directed toward other areas.

The Space Task Group included among its multiple recommendations "a reusable chemically fueled shuttle operating between the surface of the Earth and low earth orbit in an airline-type mode." Other optimistic suggestions for "a space tug, or vehicle for moving men and equipment to different earth orbits", plus a 6-12-man "space station" and 50-100 man "space base" were recommended but never fully implemented because of budgetary considerations.

COMMITTEE REACTION TO THE SPACE SHUTTLE

Powerful support for the Space Shuttle came from Chairman Miller, Manned Space Flight Subcommittee Chairman Teague, Ranking Republican Member Fulton, as well as articulate senior members such as Waggoner, Fuqua, and Roudebush. The opposition was led by Karth, the third-ranked member of the committee, who was supported by Hechler, the fourth-ranked member, as well as Mosher and Pelly, who ranked second and fifth on the Republican side.

Chairman Miller may have unwittingly added some fuel to the flames of opposition within his own committee by the fashion he structured the 1970 committee hearings on the NASA authorization. In a move which harked back to the days when Chairman Overton Brooks centralized power in the full committee at the expense of the subcommittees, Chairman Miller dispatched a memorandum on February 11, 1970, announcing his intention of holding all NASA authorization hearings in 1970 within the full committee. This contrasted sharply with the practice in other years when the subcommittees had an opportunity to probe more deeply into NASA's projected program through more detailed public hearings.

Chairman Miller made one compromise toward subcommittee delegation in his memorandum:

It is my intention, this year, to take all testimony before the full committee, and thereafter have the subcommittees mark up the bill and make recommendations to the full committee.

When he opened the public hearings on February 17, 1970, Chairman Miller made another pointed observation which was received by some committee members in a quiet spirit of resistance:

I hope we will be able to accomplish this matter in two weeks. I will ask that your questions be short and to the point because a number of the questions which are posed to the witnesses can be answered by reading the backup books which have been sent to your offices. As I indicated in my memorandum, when we have conducted these hearings, the bill will be sent to the subcommittees for markup. I will ask the subcommittees to report back to the full committee within three days with their recommendations.

Subsequently, a bruising battle occurred within the committee on whether to support the Space Shuttle, which rapidly developed as the centerpiece of NASA's program for the 1970's. Added to this fight was a projection of the furor arising throughout the Nation over the issue of whether manned space flight deserved so large a slice of the national budget pie. Even though the budget presented for NASA in

1970 was the lowest since 1962—\$3.3 billion—this issue erupted into heated debate within the committee, the Congress and the Nation.

COMMITTEE HEARINGS ON THE SPACE SHUTTLE

In six morning hearings totalling 12 hours, the committee rushed through the entire NASA budget between February 17 and 26, 1970. Most of the time was taken up by NASA presentations. When the committee members had an opportunity to question, their queries centered on the Space Shuttle and Space Station, with the major questions being directed toward cost and feasibility. Dale D. Myers, NASA's Associate Administrator for Manned Space Flight, pointed out that "we can carry to the Space Station people that are not trained as astronauts. We can carry chemists, metallurgists, physicians, astronomers, photographers—and I have added, since yesterday, Congressmen and Congresswomen." This prompted Karth to observe:

Do you have any candidates in mind? I will send you a list that I have.

With Chairman Miller's full knowledge, Teague took his Manned Space Flight Subcommittee out on his annual field trip to visit and interrogate contractors, and inspect NASA installations, just before Chairman Miller issued his edict against subcommittee hearings. As a result, early in February Teague's subcommittee visited and quizzed the officials of the Martin Marietta Corp. in Denver; North American Rockwell Corp. in Downey, California; McDonnell Douglas Astronautics Co. in Huntington Beach, California; and a joint meeting of the Boeing Company and Lockheed Missile and Space Co., in Sunnyvale, California.

Subsequent to the full committee hearings, Teague took his subcommittee to the Space Division, Chrysler Corp., at New Orleans, La.; Grumman Aerospace Corp. at Bethpage, N.Y.; and received reports from the Kennedy, Marshall and Manned Spacecraft Centers.

SUBCOMMITTEE MARKUP OF NASA AUTHORIZATION IN 1970

The Manned Space Flight Subcommittee was in a runaway mood in 1970. There was a unanimity of feeling, expressed by Chairman Teague, Ranking Republican Member Fulton, and members on both the majority and minority sides, that NASA's request for funds should be sharply increased. Fulton put it this way:

I believe that this is the year that we should move forward on manned space flight because we have had budgetary restrictions in the past two years. In light of that policy, I would recommend that we move up to the \$4.2 billion level for the

manned flight operations. So that would move the figure of \$1,651,100,000 request of NASA for Apollo to \$1,777,500,000.

In addition to stepped-up support for the Apollo program, the Manned Space Flight Subcommittee took a strongly bullish approach to the Space Shuttle and Space Station programs, urging an \$80 million increase in these areas. All in all, the subcommittee opted for an increase of \$297 million over the budget, in order to keep pace with the recommendations of the Space Task Group and to purchase long lead-time items necessary to keep the manned space flight program on schedule.

During the markup by the Karth Subcommittee on Space Science and Applications there erupted the first confrontation between supporters and opponents of the Space Shuttle. In the presence of Chairman Miller, who was attending as an ex officio member of the Karth subcommittee, Karth began to criticize NASA's cost estimates on Project Viking (the unmanned probe to Mars) as "atrociously inaccurate." Karth went on to suggest:

Here we are going into contracts on the Shuttle which for all practical purposes is a new program, not even a year old, and we haven't done the basic research necessary in the laboratory to determine just how this Shuttle vehicle ought to be built. * * *

I will predict on the record right here that program will cost at least three times what NASA today is saying it is going to cost just on the basis of our experience here in these other programs.

Chairman Miller sprang to an immediate defense of the Shuttle:

You are going to have something eventually that has to go out and visit the synchronous satellites that are going to be in space and be used for all time hence. We can't afford to orbit these things and have them go to pieces in six months to a year without being able to go out and recover them or perhaps fix them in space. That is what part of it is. You have got to have the Shuttle.

During the second day of the Karth subcommittee markup, Staff Director Frank Hammill observed: "I have heard that Mr. Teague is going to propose to the full committee that the manned space flight authorization be increased." Karth exploded:

I think that is ridiculous in a budget year like this year, particularly since the budget is within an eyelash of being unbalanced

This stimulated the following interchange:

Mr. MOSHER. What does Tiger want to do with the extra money?

Mr. HAMMILL. Mr. Teague asked Mr. Myers to tell him what he would do if the manned space flight budget were increased. * * *

Mr. KARTH. The manned space flight people think they are bad off, but 50 percent of the budget is going to manned space flight

Mr. HAMMILL. A little more, 54 percent, I think.

Mr. MOSHIER. We could try all sorts of things worth doing if we wanted to add some money. Every direction I look I see crucial needs.

Mr. SYMINGTON. It is sort of Parkinson's law of budgeting.

For New York Congressman Ed Koch, the budgetary problem was even more serious than trying to decide on whether to support the Space Shuttle. Koch zeroed in against the Viking-Mars project in the Karth subcommittee, where he told his colleagues:

I just for the life of me can't see voting for monies to find out whether or not there is some microbe on Mars, when in fact I know there are rats in the Harlem apartments.

KARTH BLASTS SHUTTLE

Even before the final committee markup of the NASA authorization bill in 1970, Karth went publicly on record with a scathing attack on the Space Shuttle. In an address on March 3, 1970 at a meeting of the American Institute of Aeronautics and Astronautics in Annapolis, Md., Karth labelled the President's Space Task Group Report and the NASA program which was based on the Report as "totally unrealistic." He exploded:

Based upon my experience with Ranger, Centaur, Surveyor, Mariner, Viking and even Explorer, NASA's projected cost estimates are asinine. * * * NASA must consider the Members of the Congress a bunch of stupid idiots. Worse yet, they may believe their own estimates and then we really are in bad shape.

Chairman Miller and Teague bristled at Karth's opposition. Miller did not want to add fuel to the flames by denouncing Karth publicly, but Teague was not at all bashful about expressing himself. In his long and successful service as Chairman of the Veterans' Affairs Committee, Teague looked on it as an unprecedented breach of Congressional courtesy and practice for the chairman of another subcommittee, who had not attended the hearings and field investigations, to take a strongly critical position against the findings and recommendations of a subcommittee of which he was not a member. Teague labelled Karth's public attack on the Shuttle as "just plain stupid," adding:

Karth could have had much more influence had he worked within the committee, but instead he went out and made a bunch of speeches and got nowhere.

Teague was so angry at Karth's public opposition to the findings of the Manned Space Flight Subcommittee, that he swore that as long as he lived Karth would not become chairman of the full committee.

FULL COMMITTEE AND NASA AUTHORIZATION IN 1970

By the time the subcommittee reports reached the full committee, the battle lines were tightly drawn.

The Teague subcommittee report, adding \$80 million for the Space Shuttle and Space Station, called for "more extensive and inclusive trade-off analyses and additional engineering studies" as well as "advanced prototype effort for testing and verification of preliminary designs." The report expressed the opinion that the additional funds would assist NASA and the Congress in future years to reach sounder decisions on the progress and timing of Shuttle and Space Station development. Despite the increase, plus other increases totalling close to \$300 million over the budget, the report noted that this was the lowest construction request for manned space flight since the inception of the program.

The sparks began to fly in the full committee the minute the Teague subcommittee report had been completed. Referring to Fulton's long-time, repeated effort to get NASA to use boron as a launching fuel, Mosher's first crack was:

When I look at these proposed increases on page 3 and page 5, I get the impression that you guys have been drinking some of Jim Fulton's boron juice.

Teague countered by reminding the committee that the President's Space Task Group had urged a billion dollars more than the Bureau of the Budget recommended, and all the subcommittee was doing was restoring less than half that amount. When Karth got the floor, he said he was willing to vote for increases in the latter stages of the Apollo program, but as for the Shuttle, "for goodness sake, wait until that Phase B study is completed, so that we have at least some grasp of the magnitude of that program, so that we have some grasp of its potential, and so that we have some grasp of precisely what we are going to do with it, and the cost effectiveness of the program. * * * Now, I say, Mr. Chairman, if I didn't have so much respect for you I would probably be shouting and waving my arms and emphasizing my points with some profanity."

Fuqua jumped into the fray to demonstrate that the increases for the Shuttle and Space Station had been well thought out:

I don't think that we are proceeding on a crash-type basis, or in any manner other than a prudent manner, in trying to get the best for our space dollar.

Hechler appalled Karth with the suggestion that a rift was developing in the committee, and the following colloquy ensued:

Mr. HECHLER. All I can say is that when the fire bell of rebellion sounds, this old fire horse has great difficulty in not joining with Mr. Karth now that there is some indication that there is a spirit of rebellion.

Mr. KARTH. Mr. Chairman, I object to being held to the word "rebellion".

Mr. DOWNING. Mr. Chairman, I certainly don't think that this is a rebellion * * *. But I do think we are making a big mistake here to increase this budget by \$300 million. Here we are going on the floor of Congress and advocating an additional

\$300 million above the budget on a program that is losing romance with the American people.

Teague was angry at the criticism levelled at his subcommittee, and shot back:

I think that our subcommittee—Lou Frey, Bob Price, Joe Waggoner, and Don Fuqua, and the group that got out and talked and worked from daylight to dark, have got a good feel for this thing, and I don't think we have a rubber-stamp something the Bureau of the Budget does. We are going along with the people halfway, going along with the people who are supposed to know something. That was the President's Task Group. What should we do, just sit back on our cans and let the Bureau of the Budget dictate every damn thing we do? * * * We are right, and we know we are right, and we know more about it than they do, and I bet you this subcommittee of mine knows more about this program than the Bureau of the Budget does.

When the full committee report came out, Teague's position was voted as the majority position. Karth's minority views on the Shuttle were endorsed by three Democrats—Hechler, Downing and Biaggi; and three Republicans—Pelly, Vander Jagt and Pettis in a written minority report. Mosher, in "Additional Views", also criticized the budget-busting recommendations of the Manned Space Flight Subcommittee.

THE SPLIT AMONG COMMITTEE REPUBLICANS

Just before the battle over the Shuttle on the House floor, it became apparent that in a close vote the position of the Republicans on the committee represented a crucial swing element. Fulton, as the long-time ranking Republican on both the full committee and the Manned Space Flight Subcommittee, had usually been an exasperating thorn in the side of both Miller and Teague, but now in 1970 his support of the Shuttle suddenly became of towering importance. Fulton's hospitalization as he recovered from a heart attack loomed as an important factor in the outcome of the vote on the House floor, which was expected to be close.

Teague had done his usual workmanlike job of lining up Republican support on his subcommittee. He could count on active help from Roudebush, Winn, Frey and Price, and certainly from Fulton on the Shuttle. It was an open question how many of the other Republicans would join Mosher in opposition.

On April 10, Mosher sent the following memo to all Republican members of the committee:

Due to Mr. Fulton's illness, and expecting him not to be here for the NASA authorization bill debate on the floor next week (probably Thursday), I am preparing to manage the bill for our side.

As you know, I will take action to reduce the authorization to the level presented to us by NASA. I have talked to Jerry Ford in regards to how we can best handle this on the Floor and believe it is imperative that we have a meeting prior to the floor debate.

Several unexpected developments produced marked changes in the scenario. The rescheduling of the House debate until the later date of April 23 enabled Fulton to make a dramatic appearance on the House floor and manage the bill for the Republican side. Mosher's meeting of the minority members of the committee did not produce a consensus. Finally, Republican Leader Ford, who initially was sympathetic to Mosher's position, eventually wound up as a supporter of the committee position rather than joining the ranks of the Karth-Mosher opposition.

THE SHUTTLE FIGHT IN THE HOUSE

On April 23, 1970, Chairman Miller led off the debate on the Space Shuttle and Space Station with these comments:

The key to the success of this Nation's future space effort lies in the development of a low cost, recoverable, and reusable space transportation system. The reusable Space Shuttle will drastically reduce the cost of putting people and cargo into space. In particular, the Shuttle will facilitate construction of a manned orbiting Space Station that will open up new areas of scientific and technological activity in the near neighborhood of earth.

"Frankly, I have hesitated to grab this tiger by the tail," Mosher told his colleagues in firing the opening gun of the opposition to "Tiger" Teague's efforts to increase the manned space flight authorization. Mosher argued:

We must put relatively greater emphasis on those aspects of the space program (where) the practical returns are the greatest * * * to the human beings right here on earth.

Mosher contended that at a time when the budget constraints were the most severe, it simply did not make sense to spend nearly \$300 million above the budget for manned projects while holding the more practical applications of unmanned experiments at the lowest possible level.

Karth insisted that his purpose was "not to kill the project, but simply to establish a realistic pace for development." He added:

Before the Space Shuttle can be a reality, many difficult technological advances must be made in such areas as configuration and aerodynamics, heat protection, guidance and control, and propulsion. * * * As a matter of fact, NASA officials are divided on the fundamental questions of whether the Space Shuttle should be a fully reusable, two-stage vehicle, or simply a recoverable orbital stage launched by an expendable first stage.

KARTH AMENDMENT AGAINST SHUTTLE

Karth's amendment to the authorization bill in 1970 cut \$240 million from the entire bill, eliminating the \$80 million increase voted by the committee, cutting back an additional \$110 million asked by NASA in its budget, and lopping another \$50 million from manned space programs.

Representative H. R. Gross (Republican of Iowa) poked fun at the Karth Amendment by contending it did not go far enough. Gross proposed instead to slash \$1.5 billion from the \$3.6 billion authorization bill for this reason:

There has been much talk about austerity here today. Well, anyone would have to have moon rocks in his head to believe there is any austerity in this program. As a matter of fact, with the amendment offered by the gentleman from Minnesota (Mr. Karth), it is still above President Nixon's budget. And that is austerity?

When Roudebush pointed out to Gross that the bill was less than spent the previous year, the caustic Gross shot back: "Well, so what? It was far too much last year." The Gross amendment was voted down, 67-19.

In the closing minutes of the debate, Karth made a strategic error in suggesting that the Space Shuttle would necessarily lead to a \$50 billion to \$100 billion manned landing on Mars. Karth stated that this "back door" approach to a Mars landing "is something I think we ought to debate loud and clear."

"There is no money in here for a manned trip to Mars," countered Fuqua. Roudebush added: "I am puzzled by the statement that the Shuttle is in some way mixed up with the Mars landing, when nothing is further from the truth." Chairman Miller also authoritatively persuaded his colleagues that there was no relation between the Space Shuttle and a manned Mars trip.

When the roll was called, many Members had left the floor and the results were in doubt. Miller and Teague had lined up their troops to stay at their posts, but the opposition was strong also. In a teller vote, as Members passed down the center aisle and were counted by Miller and Karth, it was obvious that the result was going to be a close one. Representative Louis Frey, Jr. (Republican of Florida) recalls:

I'd lobbied pretty hard with the freshmen, and after the first rush of people went through, one of the freshmen from Maryland came rushing in from a meeting and went through the line on our side. He was followed by another Maryland Congressman. The gavel came down, it was announced to be a tie vote, and so the Shuttle stayed in. The second Maryland Congressman said 'Blankety-blank it! I went through the wrong way!' As I look at the Shuttle now, I often wonder what would have happened if he'd walked through the right way.

Just before the vote was announced, several people asked Chairman Miller, who was one of the tellers: "Have you voted yet? You had better vote!" Miller quickly went through the line supporting the Shuttle, although there was some question whether he had cast his vote at the same time as Karth had, when the teller vote commenced. In any case, both Miller and Karth announced their total votes as 53, which meant that on a tie vote the Karth amendment failed by an eyelash.

FULTON'S RECOMMIT MOTION

Now occurred another crisis affecting the fate of the Shuttle. Mosher, who opposed additional funds for the Shuttle, would have been the senior minority member authorized to offer the motion to recommit the bill but for the fact that Fulton, the senior Republican on the committee, had left his sick bed to be present for the Shuttle debate. Had Mosher been allowed to present his recommit motion, it was his intention to include the Karth-Mosher amendment in that motion. There was some question whether Fulton's strength would allow him physically to remain until the end of the debate, but Fulton was a stubborn man.

By offering the recommittal motion, Fulton saved the Shuttle, since Fulton's motion reduced the total authorization bill by only \$30 million in the Apollo and space flight operations areas. Chairman Miller and Minority Leader Ford startled the House by announcing that they both were going to support the modest cut contained in the motion to recommit.

Ford then paid his compliments to Karth and Mosher for their opposition to the Shuttle, indicated he had conferred with both opponents several weeks prior to the debate, and "I must admit that many of their arguments were persuasive." Ford pointed out that the recommit motion "will do no harm to the program and yet will not hamstring the agency as to any new decisions for the future." He gave the distinct impression that the White House would not object to a net increase of \$270 million over the President's budget, and certainly would be happier if the Karth-Mosher attack on the Shuttle were rebuffed.

The recommit motion breezed through on a voice vote, and then a surprising amount of opposition arose on final passage of the authorization, which survived by a vote of 229-105. Three committee members—Karth, Mosher and Koch—voted against the final passage of the NASA authorization bill in 1970.

WHERE DO WE GO FROM HERE?

The President's Space Task Group Report in 1969, and the first efforts in 1970 by the committee to finance the Space Shuttle, failed to answer all the questions about the future goals of the space program. There was a big let-down after the first manned landing on the Moon. Near-panic struck the aerospace industry as employment sagged from well over 400,000 to scarcely over 100,000 by 1970 among NASA-supported contractors. From January 1969 through July 1970, 74,000 people employed in manufacturing in the five-county Los Angeles area were thrown out of work; 57,600 of these were aerospace workers.

Technically trained engineers and scientists were pumping gasoline, or drawing unemployment or welfare checks, while entire divisions of aerospace corporations were being phased out. In the late summer of 1970, Chairman Teague's Oversight Subcommittee planned to hold September and October hearings on the present and future of the space program. An extended session of Congress and uncertainty over NASA's appropriation legislation forced the cancellation of the formal hearings, but the testimony submitted by NASA and industry officials was published as a special committee print. After outlining the sad state of the aerospace industry, the testimony agreed that "a revitalized space program, given strong direction and adequate funding, is needed for the United States to retain its technological preeminence in the decades ahead."

COMMITTEE LEADERSHIP ON FUTURE OF SPACE

Teague had no patience with those who were contending that this country had too many internal problems to afford a high level of spending for space. As Teague put it:

If Columbus had waited until Europe had no more internal problems, he would still be waiting, but the opening of the new world did more to revive European culture and economy than any internal actions could possibly have done.

Chairman Miller, who frequently stressed the need for a more personalized, less formal dialogue than the forum of a committee hearing would allow, decided late in 1970 to plan "a small gathering of the senior members of this Committee and leaders of the major aerospace companies." In a private note to a few committee members, Miller stated: "It is urgent that we share in an exchange of ideas on what the Congress and industry can do toward assuring a vigorous and continuing space program through the 1970's." Cocktails, dinner and an extended after-dinner confab took place at the Federal City Club, Sheraton-Carlton Hotel, in Washington on the evening of

January 28, 1971. Among the aerospace leaders who attended were Thomas G. Pownall, President, Aerospace Group, Martin Marietta Corp.; L. J. Evans, President, Grumman Corp.; Allen E. Puckett, Executive Vice President, Hughes Aircraft Co.; and D. J. Haughton, Chairman of the Board, Lockheed Aircraft Corp. Teague used the opportunity to indicate that the aerospace companies were not doing as much as they should to publicize and "sell" the necessity of maintaining a vigorous space program. Pownall, in a letter to Teague on February 4, 1971, acknowledged:

Please be assured that we did get a message and that we will make an effort to improve our usefulness in some of the ways suggested.

Yet the evening's discussion failed to produce a firm consensus among all concerned as to how to recapture the spirit and vigor of the space program of the 1960's. As observed by Puckett in a letter to Chairman Miller on February 3:

It seemed to me that our discussion gave evidence once again that even among quite knowledgeable people in this field there is a considerable diversity of views as to where our space program should go, and what should be its rationale

TEAGUE ACCENTUATES THE POSITIVE

Early in 1971, President Nixon decided to appoint Dr. James C. Fletcher as NASA Administrator to succeed Dr. Thomas O. Paine, who had resigned September 15, 1970. Dr. Fletcher remained during the Nixon and Ford administrations until 1977, winning the respect of the committee for his candor and leadership.

Even before Dr. Fletcher took office, he received a jolting reminder from Capitol Hill that underscored the intense interest and concern which the committee had for the future of the space program. On Sunday, February 28, 1971, Tiger Teague picked up his copy of the Washington Sunday Star, and did a slow boil as he read an Associated Press interview with Dr. Fletcher, based on a press conference in Salt Lake City. "We may tend to reduce manned space flights in favor of unmanned flights. It would be very exciting for man to go beyond the Moon but I suspect that's beyond the country's budget. We will go beyond the Moon but probably with unmanned flights," Dr. Fletcher correctly predicted. What really caught Teague's eye, and angered him was the line reading: "Fletcher said public interest is waning in the space program 'and it's going to be up to us to have more exciting things to rekindle that interest.'"

When Teague reached his office on Monday morning, March 1, he was really fuming. He got on the phone to Jim Fulton, who was

equally upset, and the two fired off a 3-page telegram to Dr. Fletcher which really sizzled:

I completely disagree with your view that public interest is waning in our national space program. 41 million people in the United States in the last year have looked at the lunar rock samples that have been returned from the Moon. Another 2 million have visited the facilities of the National Aeronautics and Space Administration across the United States. 14 million people alone viewed lunar samples at Expo '70 in Osaka, Japan. * * * The largest number of visitors in 1970 were at two of the NASA Centers most closely associated with manned space flight. Well over one million people visited the Manned Spacecraft Center in Houston, Texas. At the Kennedy Space Center in Florida, approximately 1,200,000 visitors toured the Center because of their interest in our national space program. I can personally attest to the fact that the Apollo 14 launch attracted more visitors to the Cape Kennedy area than ever before. * * *

I hope this will help you recognize that there is great support on the part of the people of the United States in the manned space flight program and the NASA program in total. It seems to me that the most important job of the new Administration of NASA is to harness this grass roots support and to encourage a similar enthusiasm within the executive and legislative branches for our national space program. I regret that you come to a very positive agency with negative statements.

As Dr. Fletcher correctly notes today, the real waning of interest took place several years prior to 1971 with the escalation of the war in Vietnam and after the first landing on the Moon. The telegram itself stirred Dr. Fletcher to pay a personal visit to Teague. There Teague reiterated what he had told Dr. Mueller (see page 166), underlining the fact that the committee and Teague personally would back him up as long as he fought for the program.

The impulsive telegram did not constitute Teague's finest hour. Despite the examples he cited, any objective observer pretty well had to conclude that interest in and support for the space program had certainly declined since the glory days of the 1960's when Congress and the Nation were solidly and enthusiastically behind the Apollo program. As a matter of fact, Teague's own Subcommittee on Oversight, in a December 10, 1970 report—less than three months prior to the chiding of Dr. Fletcher—included this sentence in its Foreword:

And despite truly remarkable successes, public enthusiasm for the NASA program seems to have waned.

One of Teague's best friends in the House, Representative Bob Casey of Houston, Tex., who was on the Science and Astronautics Committee from 1961 to 1965 before moving to the Appropriations Committee, brought no argument or response from Teague when he made this statement during House debate on June 3, 1971:

Mr. Chairman, I want to state that in these days, when the interest of the public is waning in the space program, and when many people feel that we have

done all that we can or should do in the space program, it takes dedication and hard work on the part of this great committee which I once had the pleasure of serving upon to generate interest and to keep our great space program going.

Fortunately, Dr. Fletcher understood precisely what Teague was driving at in his telegraphic blast. At the University of Utah, where he had served as President, he was described by a fellow administrator as "devoid of vanity and willing to talk candidly about any issue, even those which might be embarrassing to either the university or himself." Teague got his point across forcefully: that at a time when the budget squeeze was on, the space program needed leadership and a minimum of negative soul-searching. Teague helped instill a fighting spirit into NASA, and never ceased to insist that the space program and its allies must accentuate the positive.

At the beginning of the 92nd Congress in 1971, the committee included the following members:

Democrats

George P. Miller, California, *Chairman*
 Olin E. Teague, Texas
 Joseph E. Karth, Minnesota
 Ken Hechler, West Virginia
 John W. Davis, Georgia
 Thomas N. Downing, Virginia
 Don Fuqua, Florida
 Earle Cabell, Texas
 James W. Symington, Missouri
 Richard T. Hanna, California
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey
 John F. Seiberling, Jr., Ohio
 William R. Cotter, Connecticut
 Charles B. Rangel, New York
 Morgan F. Murphy, Illinois
 Mike McCormack, Washington

Republicans

James G. Fulton, Pennsylvania
 Charles A. Mosher, Ohio
 Alphonzo Bell, California
 Thomas M. Pelly, Washington
 John W. Wydler, New York
 Larry Winn, Jr., Kansas
 Robert Price, Texas
 Louis Frey, Jr., Florida
 Barry M. Goldwater, Jr., California
 Marvin L. Esch, Michigan
 R. Lawrence Coughlin, Pennsylvania
 John N. Happy Camp, Oklahoma

The Subcommittee on Manned Space Flight in 1971 was assigned the following members:

Democrats

Olin E. Teague, Texas, *Chairman*
 Don Fuqua, Florida
 Earle Cabell, Texas
 Richard T. Hanna, California
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey

Republicans

James G. Fulton, Pennsylvania
 Alphonzo Bell, California
 Larry Winn, Jr., Kansas
 Robert Price, Texas
 Louis Frey, Jr., Florida

WINNING KARTH'S SUPPORT FOR THE SHUTTLE

In June of 1971, Joe Karth penned a little note to Tiger Teague about the space program. Enclosing an article from the St. Paul, Minn., Pioneer Press which depicted Karth's support for both the Space Shuttle and other space expenditures, Karth's note read:

DEAR TIGER: I just wanted you to know that while I don't agree with every d--- thing the Agency has for sale, I support the program even back home where my poll showed constituent support 5 to 1 in the *negative*!

Karth, who along with Mosher and a sizable group of committee rebels had led a nearly successful fight against overfunding the Space Shuttle in 1970, came around to supporting the Shuttle in 1971. He even went so far as to come out publicly for the Shuttle in these terms:

If we're going to have a space program, we're eventually going to have to develop a new transportation system, there's no question about it. We can't afford to build the short-launch vehicles that cost \$5 million to \$15 million which are treated like skyrockets.

What led Karth and the other rebels of 1970 to reverse their position in 1971? The answer lies in an interesting bit of parliamentary maneuvering within the committee.

In its 1971 presentation to the committee, NASA quietly dropped all references to a Space Station in their discussion of the Space Shuttle. The Space Station was a victim of chloroforming by the Office of Management and Budget. OMB also slashed the NASA request for funding the Shuttle from \$190 million down to \$100 million.

Following extensive hearings and their customary series of field trips, the Teague Manned Space Flight Subcommittee recommended increasing the authorization for the Space Shuttle from \$100 million to \$135 million. Additional increases in the manned space flight area made the subcommittee total \$90 million above the budget. Since the Subcommittee on Advanced Research and Technology was advocating a \$71.4 million increase in calendar year 1971 over the NASA budget request, and the Subcommittee on Space Science and Applications was holding its increases to \$2.5 million, it almost seemed as though the stage was set for a repeat of the 1970 fight by Karth and his subcommittee colleagues.

When the full committee met on March 30, 1971, to consider the subcommittee reports, the mood appeared to be less combative than in 1970. Mosher, who had helped lead the Republican side of the fight against the Shuttle, was more subdued in his 1971 criticisms. He told the full committee in its executive session on March 30 that he was

"somewhat unhappy and full of doubt" about the manned space flight increases. He explained his position this way:

I certainly respect the subcommittee's judgment that this money could be well used. I think my doubts hinge around the matters of political expediency more than anything else. I just have to raise the question with the mood of Congress and the mood of the people the way it is today, is it good for the space program to offer such substantial increases over and above the budget on the floor of the House? Don't we just invite resistance, invite the House to cut back even further than they might if we didn't so dramatically draw their attention to these increases?

With these various doubts in mind, I think I am going to have to reserve judgment and probably vote "present" so far as this committee report is concerned

Teague responded to Mosher by pointing out that when the space program was being slashed a billion dollars a year, \$4 billion was being voted for welfare. Bell mused that "one of the very reasons we made the increase was the fear they would be cut back and sometimes it is better to ask for a little more than we expect to get."

Wydler then expressed a common sentiment on both sides of the aisle when he observed:

I have been going along with these cuts year to year. I really feel we have reached the point where we should stand up and say "enough." I think we have allowed the space program to be treated as a form of foreign aid in the public's mind, that we are just spending money, and getting us nothing. I think we better start redirecting the public's attention to the fact they are spent to hire American people, to do American productive work and to try to save that money a little bit that we are talking about particularly, and say that we are going to then have some kind of associate program to take care of some of these people that are thrown out of this work.

Karth then announced his opposition to the \$35 million increase for the Space Shuttle:

I personally have said I guess maybe on fifty occasions that I support the orderly, well-defined and well-engineered Shuttle program, but I do think that a \$35 million increase at this point when we do not yet have the Phase B studies completed, and when we are embarking upon a major nine or ten billion dollar program * * * is probably the kind of an increase that will attract attention.

Karth termed the 35 percent increase desired by the Manned Space Flight Subcommittee "a little exorbitant." Chairman Miller and Teague both stood firm in their insistence on a \$35 million increase. Teague was the first to give the glimmer of a possible compromise, when he said: "As far as I am personally concerned, \$35 million is no magic figure at all. It was a figure we came up with after going back to NASA."

Karth then indicated he would offer an amendment to limit the increase to \$20 million. In his last markup session prior to his death

from a heart attack on October 6, 1971, Fulton finally made the suggestion that there should be a compromise because "I don't want a floor fight with this committee." Karth picked up the concept by suggesting that "I am trying to find some area where we can go to the House with a solid front." Wydler clinched the decision to move toward a compromise by a very timely statement:

I just want to say to Mr. Karth I look at this as a practical matter now. * * * I think it is much more important on the authorization bill we act as one man. I think that is the significant and important thing, and quite frankly Karth help on this bill is of very great importance to the way the bill will move. * * * I think it is terribly important that we have a unified committee, and if that is the price, let's pay it, it is well worth it in my judgment.

Fulton's compromise amendment to limit the recommended increase in the Space Shuttle authorization to \$25 million won support of the full committee. The important point is that once the compromise was adopted, Karth was locked in to support it, and his colleagues who had rebelled against the Shuttle in 1970 felt obligated to support the increase also. Mosher, who had threatened to vote "Present", wound up supporting the \$125 million for the Shuttle and also the balance of the program.

FLOOR DEBATE ON NASA AUTHORIZATION IN 1971

The floor debate on the NASA authorization bill found the committee members unanimous in their support of the Shuttle. Fuqua and Frey, joined by nine other Members, issued "Additional Views" in the committee report which outlined the strongest arguments for proceeding with the Shuttle. The Fuqua-Frey statement ended with this assertion:

The development of the Space Shuttle is essential if this Nation is to maintain its preeminence in space. We should proceed without delay. The technology necessary for the Space Shuttle development is at hand. What is required is the will to do it.

Clearly, the corner had been turned. Committee members who had opposed the Shuttle now joined a united committee front in its support. Instead of a separate report by opponents, as had occurred in 1970, there was now a separate report by Fuqua, Frey and their allies, on the positive side. The new display of unity effectively gunned down opposition to the Shuttle in the House authorization debate. And when Representative Bella S. Abzug (Democrat of New York) introduced an amendment to remove the \$125 million Shuttle authorization from the bill, the committee members moved in with a whoop and a holler and obliterated her effort by a crushing voice vote.

THE COMMITTEE AND THE 1972 SHUTTLE DECISION

One of the Shuttle's early critics, Congressman Karth, left the committee in October 1971 to assume a position on the House Ways and Means Committee. The year 1972 also marked the last year in which Chairman Miller, defeated in the California primary, served on the committee. Both Miller and Karth had been charter members who had served since the creation of the Science and Astronautics Committee in 1959.

As support for the Shuttle rose in the House of Representatives, thanks to the leadership of the committee, the opposition mounted in the Senate, where Senators Walter F. Mondale (Democrat of Minnesota) and William Proxmire (Democrat of Wisconsin) led the criticism. NASA, and to an even greater extent the Nixon Office of Management and Budget, kept a wary eye on Congress in attempting to cost out the economics of the Shuttle.

"We did not think we could sell a 10 to 15-billion-dollar program to the Congress right then", recalls Dr. Fletcher in looking back in 1979 on the decision in 1972 to reduce the size and expense of the Shuttle. Clearly, Teague, Fuqua, Frey and the strongest boosters of the Shuttle felt that the correct course of action was to press forward with the original program for a completely reusable Shuttle and Space Station at a higher cost. To Teague's consternation, the President appeared to be leaning strongly toward his budget advisers instead of choosing the bold solution. Teague publicly denounced President Nixon for failing to support the Shuttle and the space program while the big debate on the Shuttle's future was going on during 1971:

He isn't even following the advice of his own Space Task Group. They told him and us that anything below a \$4-billion budget for NASA was a "going out of business budget", but he's allowed those damned pencil-pushers in the Budget Bureau to set policy instead of following the experts' recommendations.

While the debate was going on during 1971 over the size and configuration of the Shuttle, the political cross-currents were already swirling over where the Shuttle was to be launched. Fuqua and Frey were the most articulate leaders to keep the launch facilities at Cape Kennedy, to protect NASA's billion-dollar construction investment at the Cape. The Chairman of the Senate Aeronautical and Space Sciences Committee, Senator Clinton P. Anderson (Democrat of New Mexico), terribly upset by termination of his favorite Nerva project, insisted that the Shuttle would be in trouble unless it were launched from White Sands Missile Range in New Mexico. Meanwhile, Chairman Miller mobilized the Californians to press for the use of Vandenberg.

berg or Edwards Air Force Base. NASA responded with a somewhat tongue-in-cheek letter pointing out that the Roush amendment to the authorization bill required that "consideration be given to the geographical distribution of Federal research funds whenever feasible", a provision which had rarely been used to govern decisions. In a letter to George Low of NASA, Teague seemed to lean toward the Florida site:

Unless I am convinced that NASA is making maximum use of existing facilities, I intend to oppose any money for the Shuttle in every way, form or fashion * * *. It is not "pork barrel" as far as I am concerned.

NASA made a Solomon's choice in 1972 by concluding that Cape Kennedy and Vandenberg on the Atlantic and Pacific coasts should share the Shuttle's launching facilities.

On January 5, 1972, President Nixon announced his decision:

I have decided today that the United States should proceed at once with the development of an entirely new type of space transportation system designed to help transform the space frontier of the 1970's into familiar territory, easily accessible for human endeavor in the 1980's and 1990's.

The decision involved a pared-down version of the Shuttle. Instead of a fully reusable system with a larger, manned crew, the final selection favored a two-man, recoverable orbiter which would still glide in for an Earth landing on return, but there would be an unmanned and recoverable booster and expendable fuel tanks. The smaller version was estimated to cost about \$5.15 billion to the end of the decade of the 1970's. On behalf of NASA, Dr. Fletcher issued a public statement that the Shuttle would cost \$5.15 billion plus or minus 20 percent. OMB instructed him never to mention this contingency again.

COMMITTEE REACTION TO THE DECISION

Although the committee had pressed for an early, firm decision on the Shuttle, and individual members like Frey had warned that to defer a decision beyond January would strengthen the opposition, Teague and Fuqua were not entirely happy with the cutback in the size of the Shuttle. With some asperity, Fuqua asked Dr. Fletcher when he appeared before the committee on February 8, 1972:

Is this the final configuration, or later in the year are we going to hear that has been modified, as we did last year.

Frey noted:

Of course, one of our sales pitches on the recoverable craft was the reduction in cost per pound, but now that you're going back to this concept, it seems to me you're

increasing the cost per pound, and it almost in a sense destroys the sales pitch that we originally conceived for the craft.

Not long after the decision was announced on the new configuration of the Shuttle, Fuqua recalled:

We had just finished defending one configuration on the Floor and then suddenly they announced they were going to change it. Tiger Teague got the top brass from NASA over here and raked them over the coals. We all wanted to know how long they had known they were going to change and how much of this kind of thing was going on behind the committee's back. They explained the reasons behind the changes, and everybody calmed down.

After that, though events moved pretty fast, they did try to keep us reasonably well informed.

For Teague, the decision was still the kind of small solution he wondered was really sound. At the public hearing on February 17, 1972, Teague pondered aloud whether 4 or 5 years hence "we will not look back and be sorry we did not have a more aggressive program".

THE PRESIDENTIAL CAMPAIGN OF 1972

Science Committee members who were disenchanted with President Nixon's "small solution" position on the Space Shuttle were horrified with the outright opposition by the initial 1972 Democratic National ticket—Senators George S. McGovern and Thomas F. Eagleton—as well as Mrs. Jean Westwood, the Chairman of the Democratic National Committee. Two weeks after President Nixon's decision was announced on January 5, Senator McGovern told a Florida campaign audience that if he were President he "wouldn't manufacture a foolish project like the Space Shuttle to provide jobs" and that the Shuttle was "an enormous waste of money". He labelled it "Nixon's boondoggle" and even attacked it in speeches to aerospace workers. Senator Eagleton, before his withdrawal from the Democratic ticket, indicated that the Shuttle "will deprive important social programs of much-needed revenue".

When NASA awarded a \$2.6 billion Shuttle contract to the North American Rockwell Corporation, Democratic Chairman Westwood charged it was—

the latest, and perhaps most blatant, example of President Nixon's calculated use of the American taxpayers' dollars for his own reelection purposes.

Teague publicly took exception to Mrs. Westwood's statement, and dismissed her as "uninformed on the space program," which was for Teague an understatement. Fuqua said he—

deeply regretted that McGovern and Eagleton have taken such strong stands because, at least from Sen. McGovern's statements during the Florida primary, it was quite

clear that he knew really very little about the Shuttle system that the President had endorsed.

And for Downing, fifth-ranked Democrat on the committee, it was also a shock:

I don't know how large a bloc they are, but the ticker might as well write off all the voters who are affected either directly or indirectly by the aerospace industry.

A McGovern victory in 1972 would have meant a serious blow to the future hopes of the Shuttle, especially with the rising opposition in the Senate. Senate Majority Leader Mike Mansfield (Democrat of Montana) announced his public opposition to the Shuttle on January 15, 1972—ten days after President Nixon's decisive support. The death of Senate Appropriations Committee Chairman Senator Allen J. Ellender (Democrat of Louisiana) on July 27, 1972, caused NASA to shake in its boots, because it eventually resulted in Senator Proxmire, an avowed opponent of the Shuttle, moving up to the subcommittee chairmanship over NASA appropriations. But the powerful, united support by the House Committee on Science and Astronautics helped save the Shuttle in 1972.

"BELLA, IT IS NICE TO HAVE YOU WITH US"

After hearing NASA witnesses, and visiting the contractors and NASA Centers, the Manned Space Flight Subcommittee threw its hearings open to anyone who wanted to present testimony. At 1:30 p.m. on the afternoon of March 14, 1972, Representative Bella S. Abzug (Democrat of New York) appeared in opposition to the Shuttle. For some 700 pages prior to her appearance, the subcommittee had commended and complimented a parade of Government and industry witnesses describing how necessary the Shuttle was for America's future. Now the subcommittee members eagerly awaited the opportunity to tangle with an opponent.

The hearing opened innocently enough. Chairman Teague started off with a friendly greeting: "Bella, it is nice to have you with us". Mrs. Abzug responded in kind: "It is nice to be here, Mr. Chairman". She then launched into a broadsided attack on the Shuttle:

Now that NASA has reached the Moon, it is seeking a new, similarly glamorous toy for its next project and it feels that a Space Shuttle would be just the ticket. * * * I would remind you that the President recently vetoed as fiscally irresponsible a bill that would provide only \$2 billion for child care centers, a mundane but urgent issue for the millions of working parents in this country * * *. I favor the use of light-weight, unmanned, instrumented systems which can produce the same results as our manned program at a fraction of its cost.

Representative Larry Winn, Jr. (Republican of Kansas) asked Representative Abzug whether she knew that the Shuttle would add \$914 million to the gross state product of New York State and produce 12,594 new jobs for aerospace workers in New York. Mrs. Abzug answered that she was aware that this would add temporary jobs, but she favored a full employment program:

I believe we should utilize the energies and strength and the creativity of our own people and our own science to create new ways to improve the quality of life here on earth.

Winn pointed out that it was impossible "to take the money that we would spend on the Space Shuttle and put it into the expenditures for the social ills * * *. We don't have an appropriation program of 'put and take'. Each must stand on its own priorities'".

Wydler commented on the plight of the aerospace workers on Long Island:

Thousands of these people are out of work, thousands of their children are suffering, they are suffering, their wives are suffering. They need some relief, some help from us in the Government. It would seem to me we would be helping those people if we were to pass this program. For that reason alone, it would seem a very people-oriented program. This money doesn't go overseas as foreign aid. It goes into our own country, to our own people, working and struggling to keep our Nation in space and ahead in technology.

Fuqua called attention to the mobile cancer detection units in operation in the Bedford-Stuyvesant area in New York City, adding:

I think we are getting many things from our space program that are being applied to solve many of the human needs we have. I cannot think of a better program than a cancer detection unit in such areas as Bedford-Stuyvesant.

Mrs. Abzug countered:

We are not in disagreement on that. It is that I am inclined to favor the use of lightweight, unmanned instrumented systems which I understand can produce the same results as our manned programs, at a fraction of the cost.

Fuqua responded:

The cost would be reduced in half, even in the unmanned area, by having a Shuttle in order to place it in proper orbit, and the fact that they can return vehicles.

Chairman Miller entered the hearing room, and he and Representative Richard T. Hanna (Democrat of California) tried in vain to get Representative Abzug to admit that the Shuttle was really beneficial. Other committee members gave Mrs. Abzug a hazing for daring to oppose and presuming to know more than they did about the worth of the Shuttle. It almost seemed at times that they were attempting to accomplish a rite of exorcism for the heretical beliefs

she espoused. Teague, presiding over the hearing, who was ordinarily the toughest-talking and bluntest member of the committee, ended the confrontation on a note as soft as he had opened it:

Mrs. Abzug, thank you for your testimony. I think I have a point we can all agree on, that it would be great to be a Member of Congress, if we just knew the right answers

COMMITTEE SUPPORT IN 1972 DEBATE

Although the committee report strongly endorsed the Shuttle once again in 1972, Congressmen Fuqua and Frey rounded up eleven additional committee members to sign "Additional Views" containing even stronger support. The "Additional Views" labelled the Shuttle a "national necessity", and were signed by eight Republicans (Frey, Bell, Pelly, Wydler, Price, Esch, Coughlin and Camp) and five Democrats (Fuqua, Davis, Cabell, Hanna and Flowers).



Committee members inspect progress on Space Shuttle at Marshall Space Flight Center. From left, Representatives Olin E. Teague (Democrat of Texas), Walter Flowers (Democrat of Alabama) and Don Fuqua (Democrat of Florida).

The committee recommended \$200 million for NASA in 1972 to develop the Shuttle—precisely the amount NASA had requested from the Office of Management and Budget and the same amount budgeted by the President. Mosher, taking the floor for the first time as the ranking Republican on the committee, recalled the fight that he and

Karth had led against the Shuttle in 1970. He contrasted the situation in 1972, when the committee supported "a Shuttle program very much diminished and simplified, much less costly than was contemplated two years ago." Mosher added:

It is the product of a tremendous amount of careful reconsideration and better preparation. It does represent the "go slow" policy which we urged two years ago. So, I stand before you today, confessing that I once was very much a skeptic concerning the Shuttle plans. Now, I have changed my mind and I believe it is for entirely valid reasons * * *. The Space Shuttle program as now proposed is considerably different from that first recommended. The total development costs for the Shuttle have been reduced from \$13 billion to \$5 billion, to be spread over some 6 years.

The floor attack on the Shuttle was led by Representative Les Aspin (Democrat of Wisconsin), who predicted costly over-runs in the development of the new program. Fuqua predicted that NASA would pretty much stick to the ball park estimates of \$5.15 billion. NASA came close, but needed more funding in 1979 and later years.

Aspin introduced an amendment on the floor to eliminate the \$200 million authorization for the Shuttle, and have the National Academy of Sciences conduct a one-year study on whether further funds should be spent on the Shuttle. Wydler pointed out that "there is no earthly use in sending to the National Academy of Sciences for a study * * *. We have that information available now. There is nothing more to study regarding it. This body can make up its mind whether it wants a Shuttle or not."

Both Majority Leader Hale Boggs (Democrat of Louisiana) and Minority Leader Gerald R. Ford (Republican of Michigan) spoke against the Aspin amendment. Boggs warned that "if we delay for another year, we will never regain the momentum the space program now has." Ford used the analogy of military weapons programs which had resulted in cost over-runs due to starting and stopping, and he urged that the Shuttle be carried through to its conclusion "on the schedule that has been announced."

The Aspin amendment was clobbered on a division (standing) vote by 103-11. Then the NASA authorization bill was passed by the comfortable margin of 277-60. The committee was victorious in keeping the \$200 million authorization at that level throughout the legislative process, including the appropriation by both the House and Senate.

THE COMMITTEE AND SHUTTLE CONTRACTS

The committee, its individual members, and the Manned Space Flight and Oversight Subcommittees took a vigorous and continuing interest in how NASA awarded and administered the contracts for the Space Shuttle. The biggest controversy erupted over the initial con-

tract for the main engine. The chief competitors were North American Rockwell Corp. and Pratt & Whitney Aircraft Division of United Aircraft.

When NASA announced July 13, 1971 that the Rocketdyne Division of North American Rockwell had been awarded a contract of half a billion dollars for the development of 35 Space Shuttle main engines by 1978, Representative William R. Cotter (Democrat of Connecticut) protested the award and he also requested an investigation by the General Accounting Office. Congressman Cotter and the committee, as well as the G.A.O., asked NASA for the reports of their Source Evaluation Board. It is interesting to note the different fashion in which NASA Administrator Dr. James C. Fletcher responded, as contrasted with two of his predecessors, Administrators Dr. T. Keith Glennan and James E. Webb. Dr. Glennan and Webb had adamantly insisted that any release of Source Evaluation Board data to the committee would compromise the confidentiality of their private-source assessments of the companies that were bidding. Dr. Fletcher blithely went ahead and furnished the committee with the requested information, including the detailed analysis showing the point totals of the competing companies in various categories, and precisely how the decision was reached to award the contract to the Rocketdyne Division. Interestingly enough, the dire predictions made by Dr. Fletcher's predecessors about destroying the confidentiality of the evaluation system never materialized. And the G.A.O. on March 31, 1972 concluded that the NASA award "was consistent with applicable law and regulations." Subsequently, on July 26, 1972, North American's Rocketdyne Division was awarded a \$2.6 billion, 6-year contract for the Shuttle.

Understandably, all members of the Science Committee fought like tigers (no pun intended) for their states and congressional districts when it came to the awarding of contracts. Congressman Wydler was an effective advocate for Grumman Aerospace Corp., and joined the Manned Space Flight Subcommittee in order better to represent his district's interest in the Long Island firm's role in developing the Space Shuttle. Fuqua and Frey worked long and hard to help stress the preferable location of Cape Canaveral as a launching and recovery site for the Space Shuttle. Chairman Miller, despite his frequent admonitions that "the space program is no WPA program," unabashedly touted the superior advantages of California aerospace concerns. In a letter to Dr. Fletcher dated January 28, 1972, Chairman Miller urged NASA to get on with the final award of the main engine-Space Shuttle contract:

I trust the decision will be forthcoming soon to continue with the contract as awarded to Rocketdyne for the good of the Space Shuttle program and the welfare of the country.

An innocent little note attached to the carbon copy of Chairman Miller's letter included the typed notation: "Attached letter drafted by North American-Rockwell."

Even the have-nots of the committee tried to get into the act. At the request of Congressman Hechler, NASA staged an all-day conference and expended considerable Federal funds for an elaborate briefing of West Virginia manufacturers and small businessmen, advising them how to get a fairer share of space contracts.

The oversight activities of the committee were searching, analytical and thorough. Under the leadership of Chairman Teague, while he chaired the Manned Space Flight and Oversight Subcommittees and later the full committee, and ably followed by his successors—Fuqua and Downing—the annual visits to the contractors and installations, plus the insistence on close committee and staff contact, produced excellent results. The committee and its leadership effectively carried out the dictum of Chairman Teague: "We don't want any scandals in NASA." And there were no major scandals, either.

To be sure, there were instances of waste. There were instances of mismanagement, fostered by poor administration. There were losses of human life, and incredible errors which resulted in the loss of valuable Federal investments in spacecraft. Yet the space program was remarkably free of the kind of criminal activity resulting in the enrichment of private or Federal officials as sometimes seemed to occur in other Federal programs. The alertness of the committee oversight deserves credit for this result.

A NEW CHAIRMAN FOR MANNED SPACE FLIGHT SUBCOMMITTEE

When Tiger Teague succeeded George Miller as chairman of the full committee in 1973, the game of musical chairs for subcommittee chairmanships began. Throughout the 1960's and early '70's, Teague had been the guiding force of the Manned Space Flight Subcommittee which he chaired. Starting in 1963, Don Fuqua had joined Teague's subcommittee and the two worked well in tandem, ably supported as the years went on by Republican veterans like Winn, Wydler and Frey.

Fresh from two terms in the Florida state legislature, where he had been named in 1961 as one of the most valuable members, Fuqua was the youngest Democrat in the U.S. Congress when he was first elected at the age of 29 in 1962. The former state president of the

Florida Future Farmers of America was a farmer by both trade and training, and it would have been natural for him to be assigned to the House Committee on Agriculture, but another Floridian, Representative D. B. "Billy" Matthews, already occupied a slot on that committee. Up to 1963, Florida had never had a member on the Science and Astronautics Committee, and in that year both parties corrected the oversight by assigning Republican Edward J. Gurney and Democrat Fuqua to the Science Committee.

Fuqua's district includes the University of Florida, Florida State University and Florida A. & M. University, as well as five community colleges. The 1960 census had resulted in the creation of his district—which at first included 13 counties sprawled across the middle of Florida's panhandle. Another redistricting in 1966 spelled danger for Fuqua, pitting him against the popular veteran Congressman Matthews. The two Democratic incumbents fought it out and Fuqua survived the biggest political challenge of his career.

On the Science Committee, Fuqua rose through the ranks and in 1971 was named the first chairman of the new Subcommittee on International Cooperation in Science and Space. In January, 1972, he moved up to take over the chairmanship of the important Subcommittee on NASA Oversight of which Teague himself had been the first chairman.

As Chairman of the Manned Space Flight Subcommittee, Fuqua presided over the big development decisions relating to NASA's Space Shuttle, the final phases of the manned orbiting Skylab, and the successful Apollo-Soyuz link-up in space between American astronauts and Soviet cosmonauts. The Manned Space Flight Subcommittee merged with and was renamed the Subcommittee on Space Science and Applications after the reorganization and expansion of the full committee's jurisdiction in 1975. Fuqua then chaired in the following years not only the further development of the Shuttle, but also all other activities of the National Aeronautics and Space Administration with the exception of aeronautics.

OVERSIGHT ON THE SHUTTLE PROGRAM

In its oversight activities, the committee closely followed NASA's procedures throughout the Shuttle program, with emphasis on safety, scheduling, costs, manpower, facilities, and reliability. As initially planned, the Shuttle was to cost \$5.15 billion in 1971, at which time the first manned orbital flight was scheduled for 1978. At the committee review on October 18, 1979, NASA indicated that the cost would probably amount to 20 percent over the estimate in 1971 dollars, while the launching of the first manned orbital flight was scheduled by the middle of 1980.

Attempting to avoid delays, the committee spent considerable effort weighing the amounts of money needed each year to accomplish the announced objectives. This meant insuring that sufficient manpower, both in NASA installations and industrial contractors, was consistently available to do the job and carry out the program effectively.

The committee recognized that it was crucial to provide sufficient funds for getting the Shuttle program designed, and to procure the necessary long-lead items essential to carry out the schedule. Through their questioning in the 1973 hearings, for example, Fuqua and Frey ascertained that the tight cost ceilings imposed by the Office of Management and Budget were holding up the employment of manpower on critical subcontracts. As a result, \$25 million was added by the committee to the \$475 million which NASA originally was allowed in the President's budget. Still, the program was underfunded.

THE OPPOSITION IN 1973

The indefatigable Representative Bella S. Abzug challenged the Shuttle authorization in 1973, through an amendment to eliminate all funds for that purpose. She noted during the debate:

It has been argued the Space Shuttle would enable us to leave the Earth when it becomes too crowded or too polluted for existence here. I can understand people wanting to leave the planet, especially—at this time—some people at the White House. I think the Space Shuttle will be so stuffed with armaments that there may be no room for people.

Returning to the House for the first time since a hospital stay, Teague led the fight against the Abzug amendment in 1973. In addition to the usual arguments favoring a low-cost transportation system in space, Teague brought out the benefits which would accrue from the numerous payloads which the Shuttle could carry—which could result in "medical and health care, materials and manufacturing processes, and earth resource exploration." The Abzug amendment was defeated on May 23, 1973 by a division (standing) vote of 95-20.

THE MAIN ENGINE PROBLEMS IN 1974

From the start of the Shuttle program, it was clear that the development and qualification of the main engine was the principal pacing factor. In an attempt to avoid time slippages, NASA requested \$889 million from the Office of Management and Budget in 1974, and was granted only \$800 million. This cut critically affected the schedule on the main engine. William A. Anders stated on September 19, 1979:

The Nixon administration did not live up to agreements of initial funding and subsequent budget levels nor was the contingency recommended by NASA allowed.

During the authorization hearings, Fuqua had this colloquy with Dale Myers, Associate Administrator for Manned Space Flight in 1974:

Mr. FUQUA. The \$89 million that was reduced by OMB in the request for the Shuttle, if you had that money, where would you put it?

Mr. MYERS. We would put it, I think, in the area of the orbiter subsystems, mostly into the subcontracts on the orbiter and into the main engine.

Mr. FUQUA. How much in the main engine would you think you'd need?

Mr. MYERS. I think it would be about \$20 million of that \$89 million that would go into the main engines.

As a result of this and other inquiries, primarily in the field, the committee decided to add \$20 million to the NASA authorization to enable the work on the main engine to get back on schedule. In 1974, Representative Abzug confined her opposition to critical questions and neither she nor any other Member introduced an amendment to cut Shuttle funding in 1974.

The \$20 million which the House added, however, was pared down to a mere \$5 million increase when the issue was resolved in the conference committee. This prompted Mosher to observe when the conference report returned to the House floor:

The compromise reached was an increase of \$5 million, or \$15 million less than the House had sought. This compromise is a signal that the Congress is looking to NASA to hold the Space Shuttle program to original NASA estimates; we will be very reluctant to provide supplementary funding for every minor program perturbation encountered.

As on other occasions, the committee was deeply concerned with the problem of continuity of trained technicians and general manpower problems in 1974. When Rockwell International President J. P. McNamara was briefing the committee on minority hiring, Representative John N. Happy Camp (Republican of Oklahoma) wondered: "Is that minority you're talking about Republican?"

THE SHUTTLE AND THE AUTOMOBILE

"The Shuttle will do for the exploitation of space what the automobile did for interstate travel," Winn told his colleagues during the 1975 debate on the NASA authorization bill. Frey, another outspoken advocate of the Shuttle, indicated that in 1975 there were almost 31,000 contractor employees in 47 states working on the Shuttle, an employment figure which was due to rise to 34,000 in 1976 and 50,000 by 1977.

By 1975, the serious, organized opposition to the Shuttle was winding down. Instead of attacking the Shuttle, Representative Bella S. Abzug directed her fire at a NASA-drafted section of the authorization bill which empowered the NASA Administrator to prohibit the disclosure of technical information if it "contains ideas, concepts or

designs which have been submitted in confidence to the Administration by any person, firm or institution" or might result in release of information to foreign competitors. Mrs. Abzug pointed out that the Freedom of Information Act fully protects both trade secrets and the national security, and she submitted an amendment to delete the offending section. Chairman Teague, after consultation with the House Government Operations Committee which administers the Freedom of Information Act, accepted the Abzug amendment.

Representative Herman Badillo (Democrat of New York) noted that "President Ford has asked Congress to hold the line on spending, exercise fiscal restraint, and enact no new social welfare programs, yet would provide more than \$1 billion for research and development of a Space Shuttle." But neither Badillo nor any other Member of the House offered any amendment in 1975 to cut the Shuttle authorization, a signal that the Shuttle expenditure was generally supported and well justified through the committee's leadership.

AUSTERITY HITS THE SHUTTLE

The effect of funding cuts in 1974 and 1975 produced a 15-month slippage in the Shuttle schedule, pushing the first planned orbital flight farther down the road. The stretch-out in schedule also increased the projected total research and development cost from \$5.15 billion to \$5.22 billion, in 1971 dollars. By 1979, cost was over \$6 billion.

In 1976, NASA's budget request was cut \$182.6 million by the Office of Management and Budget. Most of this cut was sustained by the research and development area, and of course had its effect in the development of the Space Shuttle as well. One of the challenges faced by the committee was how to insure that safety, reliability, good management and cost controls could be achieved with a minimum adverse effect on the scheduling. Fuqua remarked during the floor debate on the NASA authorization bill in 1976:

In the past year, detailed reviews were made to assure us that our program was both technically sound and cost effective. As a result, some tests were deleted and deferred ***. Too much testing can be costly ***. In the case of the Shuttle, NASA deleted some large module testing. In these cases, the tests were found to be redundant, or alternate verification methods were defined which were more cost effective.

Winn, the ranking Republican on the subcommittee, observed in 1976:

NASA's Space Shuttle program remains within cost and schedule despite budgetary constraints and past deferrals. During our series of field hearings, I became convinced that the morale of NASA personnel and their principal contractors is quite high in the face of these pressures, and they are doing an excellent job on the Shuttle

According to Frey:

It appears to me that NASA and the major Shuttle contractors have responded very well to budget austerity and are still within cost and schedule on this very challenging program. NASA has had "to do more with less" and will suffer the loss of an additional 500 civil servants (next year) * * *. I should remind my colleagues also there is no more room for stretching out the Shuttle and meeting cost and schedule commitments.

THE AIR FORCE AND THE SHUTTLE

Ever since the designation of Vandenberg Air Force Base as a western Shuttle launch and recovery site, the Air Force participated with NASA in the development of the Shuttle program. Hearings by the subcommittee in 1977, chaired by freshman Representative Albert Gore, Jr. (Democrat of Tennessee) explored the nature of the Air Force activities. As budget difficulties forced the scaling down of the Space Tug, originally planned to boost Shuttle payloads from Earth orbit into geosynchronous orbit or deep space, the Air Force proceeded with development of an "inertial/upper stage" (non-recoverable).

At the same time, private industry was developing spin stabilized upper stages with the use of Atlas Centaur and Delta expendable launch vehicles. In his testimony before the committee on January 26, 1978, Lt. Gen. Thomas F. Stafford, Commander of the Air Force Flight Test Center and former Gemini and Apollo astronaut, praised the cooperative relationship between NASA and the Air Force on the development of the Shuttle:

I just cannot agree with the critics that NASA and the Air Force are not getting along well, since I have been in it deeply for 13 years.

THE FIFTH SPACE SHUTTLE ORBITER

In 1978, members of the committee were horrified to find out that NASA's budget had been clipped again, to cut off funds for a proposed fifth Space Shuttle orbiter. Representative Jim Lloyd (Democrat of California) was the first to raise the flag on behalf of the fifth orbiter in this question to General Stafford:

I notice that we have cut out one of the Space Shuttles in this year's budget. Within the realm of practicality, from your own point of view and wearing the uniform that you are, could you comment on that? Is that the right thing to do or should we go forward a little stronger?

General Stafford went as far as he could and still remain supportive of the President's budget:

Looking at the Department of Defense's requirements for satellite payloads, and what NASA has before it, it would be a very tight schedule, particularly if there is any delay. But as long as the production line is open to procure the fifth one at this time, I certainly go along with it

Congressman Winn was in a determined mood when NASA Administrator Dr. Robert A. Frosch appeared before the Subcommittee on Space Science and Applications on February 23, 1978. He laid it on the line:

The decision to delay the procurement of the fifth orbiter is very depressing. It's my understanding that in the next two years the plan is to save \$57 million by delaying the procurement. But if the fifth orbiter is procured it will then cost an additional \$235 million. I can only draw one conclusion from this: that the Administration must feel that the odds are really stacked against the fifth orbiter to make that wild a gamble.



Representative Jim Lloyd (Democrat of California)—second from left—examines model of the Space Shuttle with Representative Doug Walgren (Democrat of Pennsylvania)—far right. Astronauts Charles G. Fullerton (left) and Fred W. Haise, Jr. (second from right) participated in the approach and landing tests of the Space Shuttle at the Dryden Flight Center in California.

Lloyd and Winn received unanimous support from the subcommittee and full committee, as well as the House of Representatives, in adding \$4 million to the NASA authorization in 1978 to restore the fifth Space Shuttle orbiter which had been budgeted out. Wydler, the ranking Republican on the full committee, added his support for the fifth orbiter during the floor debate. Strong support for the Shuttle program also came from another Republican committee member, Representative Robert K. Dornan of California. The committee recommended increases for purchase of long-lead items and to keep the

option for a fifth orbiter also passed the Senate, thereby insuring its inclusion in the final conference committee action. In addition, the committee persuaded the Appropriations Committee to include the \$4 million increase to lock it in.

THE SHUTTLE IN PERSPECTIVE

Because millions of people throughout the Nation did not share in the same commitment to the Space Shuttle as they had to the Apollo program when it first started, it is remarkable that the committee successfully managed to push the program through the Congress throughout the decade of the 1970's. It is true that in areas closer to Vandenberg Air Force Base, Kennedy Space Center, and the various contractors, people flocked by the thousands to see and support this new development in space transportation. Yet the committee shouldered a major educational burden in convincing the Congress that over \$5 billion should be invested in a bird which would not fly until after 1979. In the early 1970's the argument was used that tremendous savings would result from bringing down the launch costs. As time went on, the justification for the Shuttle continued to emphasize savings, and also stressed the versatility of missions which the Shuttle could perform.

The leadership of Tiger Teague, first as chairman of the Subcommittee on Manned Space Flight, then as chairman of the full committee from 1973 through 1978, was a major factor in the successful progress of the Shuttle. Teague initiated the practice of annual visits to the contractors and space installations, which was carried on by Don Fuqua when he succeeded to the subcommittee chairmanship and to an even greater extent as full committee chairman in the 96th Congress. The active participation and support of leading Republican Members like Jack Wydler, Larry Winn, and Lou Frey were vital in paving the way toward smoother progress for the Shuttle. Aggressive oversight by the committee, through repeated hearings, field trips, queries and published reports, also was an important feature of the legislative process. The annual reports which the committee developed on the Shuttle, supplementing the formal hearings record, show how this incredibly complex mechanism was developed and pushed forward despite many obstacles and delays.

Looking back on the many milestones of the past decade, the day after he was chosen as the new Chairman of the Committee on Science and Technology, Congressman Don Fuqua reflected that one of the Shuttle's biggest technical and administrative problems had

been the development of its main engines. Fuqua observed that management problems dominated the early phases of the Shuttle development, and gradually as time went on they were intermixed with engineering problems. The decision to use existing facilities, on which the committee insisted, saved millions of dollars and as many headaches for the program.

SUPPLEMENTAL FOR SHUTTLE

On March 28, 1979, Fuqua addressed the House on the first of two big monetary deficits which plagued the Shuttle in 1979. He told the House that unless NASA received an \$185 million supplemental shot in the arm, there would be a 4-6 months' delay in the first orbital launch and more than \$1 billion of additional costs to NASA. The tight budget restrictions which had kept NASA's spending within 10 percent of the original estimates "have required pushing testing to late in the program and consequently difficult technical problems have been encountered and are being overcome later in the development cycle", Fuqua told his colleagues. Winn added that "nearly half of the 42,000 contractor personnel would be laid off" if the \$185 million supplemental were not enacted. He made this observation on the management of the program:

The very nature of this program has the potential of many serious impairments and setbacks. In spite of this huge potential, however, this program is within 6 to 12 months of the original 1971 schedule and 10 percent of the original cost. I submit to you that there cannot be any mismanagement when a program of this magnitude and complexity is as close as it is to the original plan.

Wydler also stressed the bipartisan nature of the support for the increased funding. Nelson and Flippo also spoke for authorizing the additional \$185 million, which passed by the topheavy vote of 354-39.

ADDITIONAL FUNDS REQUIRED

Not until after the passage of the supplemental authorization by the House did NASA notify the committee that several hundred million dollars more would be needed in 1979 and 1980 to meet unforeseen problems. The 1979 funds were subsequently reprogrammed from production funds. Committee members were understandably angered that NASA officials had assured the committee in January and February that the supplemental would be enough to keep the Shuttle on schedule. As soon as he learned the shocking news, Fuqua on May 4, 1979 ordered a review of NASA's operating procedures and management practices and scheduled Shuttle hearings for June 28, 1979.

The atmosphere was tense when Dr. Frosch and the contractor representatives assembled in 2318 Rayburn on June 28. Fuqua and Winn reiterated their strong and continuing support for the Shuttle, but made no bones about their displeasure with the failure of NASA to communicate the problem. Winn put it most sharply:

The apparent cost over-runs which have been incurred could have profound effects on the entire space program, not just the Space Shuttle. The political controversies that will occur because of these over-runs will continue for some time and may do irreparable damage to the integrity of NASA as a mission-oriented agency. * * *

After spending all of these years traveling from one briefing on Shuttle status to the next, I feel like I have totally wasted my time. The visits gave me the confidence to go before my colleagues in the House of Representatives and fight for the necessary support to move this program along. I can see now that it was a false sense of confidence.

Dr. Frosch explained simply that "it has been necessary for us to spend more resources to accomplish the development program than we had planned", requiring an additional \$220 million as a budget amendment to the regular authorization bill passed in 1979. Even with these additional funds, NASA estimated that the first manned orbiting Shuttle flight would be delayed from its projected November 1979 date until 1980. Dr. Frosch added:

Early in the Space Shuttle program NASA established a philosophy of maintaining an austere budget environment. Budgetary reserves were maintained at Headquarters and only utilized after review by the highest levels of management. This was a different philosophy than used in Apollo, in which reserves were approved and maintained at lower levels of management.

The unforeseen developments raised the total cost of the Shuttle to over \$6 billion in 1971 dollars, which was about 20 percent above initial estimates. These events resulted in a tightening of NASA's management control, as well as a much closer oversight by the committee through its visits to NASA centers and more frequent and franker communication with both headquarters and field personnel, as well as contractors.

Although NASA had a reserve fund known as "Allowance for Program Adjustments" (APA), Dr. John Yardley, NASA's Associate Administrator for Space Transportation explained it this way in his colloquy with Fuqua:

We also, I will have to confess, thought we were getting a little pressure from Marshall and Kennedy to get in and get some of the APA before Johnson and Rockwell used it all up, if you want me to be brutally frank. So we were somewhat suspicious of the inputs at this time. They were pretty fuzzy.

Mr. FUQUA. There was a raid on the cookie jar?

Mr. YARDLEY. Right.

Winn added this graphic comment:

It seems to me that you guys were drowning, but you didn't really know you were drowning so you didn't yell for help

To this, Dr. Frosch responded:

It is always a question of difficult judgment as to when you cross the line between crying wolf because you think something might happen and informing people because you're pretty sure something might happen.

On August 30, 1979, Chairman Fuqua released a report of the Subcommittee on Space Science and Applications which took both NASA and Space Shuttle contractor management to task for their shortcomings in assessing Shuttle budget requirements. In releasing the report, Fuqua noted:

The Space Shuttle program has been austere from the very beginning and program reserves have been inadequate to cope with cost growths and schedule delays, which have resulted from work deferrals from one year to the next throughout the life of the program.

Winn stated:

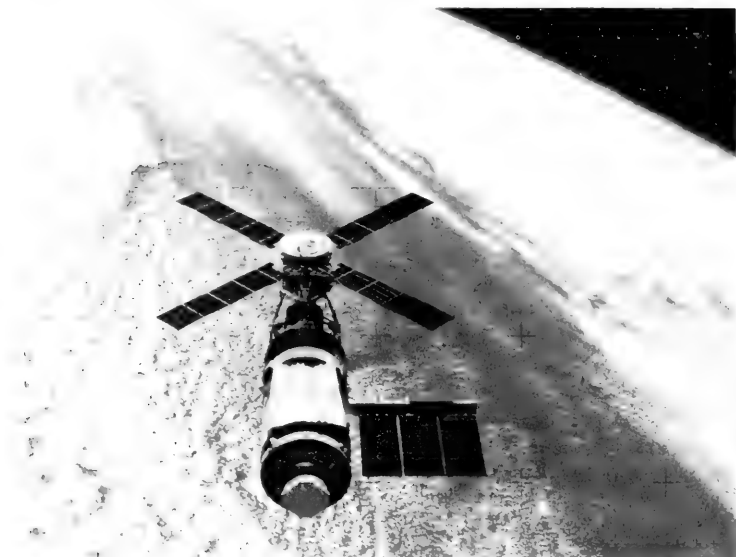
I have been very displeased with the financial planning that has taken place in the past year. There is no doubt in my mind that NASA has the capability to effectively manage the Shuttle program and develop realistic financial estimates. However, this recent cost overrun is a drastic mistake in these times of fiscal austerity. I hope NASA will draw upon their capability to provide more realistic cost estimates in the future.

On a more positive note, the subcommittee report expressed confidence in the integrity of the system design of the Space Shuttle program. Fuqua warned that "NASA must demonstrate and reestablish its credibility with regard to controlling cost growth and forecasting budget requirements." The report recommended that an annual financial assessment of the Space Shuttle program be conducted above the level of NASA's Office of Space Transportation Systems.

At the subcommittee's fall program review of the Space Shuttle program on October 18, 1979, Wydler remarked:

I am deeply worried about what is happening to the Space Shuttle. * * * it could well mean serious difficulties for our national space program in the years ahead. My feeling is that we haven't got this program under control, that we really don't know when we are going to be ready to fly, that the cost overruns are well in the neighborhood of about a billion dollars.

The final chapter has not yet been written on the success or failure of committee oversight on the Shuttle, as the first manned orbital flight has, as of this writing, not yet occurred. But the record of the 1970's is an instructive and revealing account of how a congressional committee grappled with a totally new program in a highly technical field where the targets were always moving at incredible speeds.



Overhead view of the Skylab space station taken by Skylab 4 crew which included Astronauts Gerald P. Carr, Edward G. Gibson, and William R. Pogue.



Representative Bob Bergland (Democrat of Minnesota), later Secretary of Agriculture, a committee member from 1972 to 1975.



Representative Charles B. Rangel (Democrat of New York), who fought against racism among NASA employees at Johannesburg (see pages 345-50).

Space Science and Applications in the 1970's

On the first anniversary of the first manned landing on the Moon, Chairman Miller on July 20, 1970, made this observation in a public address before the Engineering Foundation Conference in Deerfield, Mass.:

The Apollo program met a very real national need. * * * The Committee on Science and Astronautics of the House of Representatives identified that need nearly a year before President Kennedy made his appeal to the Nation to launch the Apollo program. The President could hardly have set such a bold and challenging goal for the Nation in the sixties without knowing that many key Members of Congress were already behind him. * * * From a Congressman's point of view, I can say only that it is of great value in the annual battle for funds to have a firm commitment to completing the job and a schedule that must be met.

APOLLO APPLICATIONS BECOMES SKYLAB

The committee enthusiastically supported funding of the Apollo Applications program during the nineteen sixties, although a majority of the committee became miffed at Fulton for slashing the program through several recommittal motions. Early in 1970, NASA announced that "Apollo Applications" had been redesignated as "Skylab." With the cancellation of the Air Force's Manned Orbiting Laboratory (MOL), NASA had the manned orbiting workshop to itself, a decision which the committee encouraged and helped to fund.

Somewhat overshadowed in the hectic debate over funding the Space Shuttle in 1970 was the strong committee support for adding \$75 million for the manned Skylab in the authorization bill passed by the House in 1970. Roudebush, during the debate in the House, reminded his colleagues:

Personally, I am a great believer in the authorization committees of this House. I do not suppose there is any group of men more familiar with our space program than the House Committee on Science and Astronautics. The committee's considered judgment was that a portion at least of the original recommendations by NASA to the Bureau of the Budget should be restored. * * * \$75 million has been added to augment the spacecraft and subsystems for a low Earth orbiting laboratory called Skylab. This additional funding would give emphasis to Earth resources and medical experiments, and would permit work to commence in the field of design for a second orbital workshop.

RENEWED SUPPORT FOR SKYLAB

In the authorization hearings in 1971, Congressman Winn first raised the question of a possible second series of Skylab flights, noting:

After the Skylab missions in 1973, we face at least four years in which there will be no U.S. manned space flight.

The committee in 1971 recommended adding \$30 million to examine the possibility of a second Skylab set of missions in 1974. The House approved this addition. Also, the committee recommended, and the House endorsed adding \$15 million for Skylab "for a rescue capability for the most probable failure situations."

The \$15 million add-on was a personal victory for Manned Space Flight Subcommittee Chairman Teague. Safety in space had been one of Teague's highest priorities from the start of the space program. The loss of three personal friends and the investigative hearings on the Apollo fire seared the issue even more deeply on his mind. In a brief and pointed letter to the President on November 5, 1969, Teague noted:

One portion of this future effort continues to concern me and that is the ability to provide space rescue and to react adequately to space flight emergency. Both the Space Task Group Report and the NASA report discussed in substantial detail future significant directions necessary for a well-balanced space program. However, no discussion or consideration is provided in this report to react to space flight emergencies and to provide for space rescue capability. The programs proposed fail to provide the focus and impetus necessary to assure the adequate planning for a true space rescue capability.

As their initial response to the Teague letter, NASA appointed a space station safety adviser and also established a Shuttle safety advisory panel. As a subsequent followup, during 1970 the NASA centers at Cape Canaveral, Huntsville, and Houston made feasibility assessments of providing a crew rescue capability for Skylab. This resulted in a decision to modify a command and service module by removing the astronauts' stowage lockers so as to accommodate a five-man crew instead of three; the modified craft would then be launched with two astronauts if necessary to rescue the three astronauts in the Skylab orbital workshop.

The committee solidly supported Skylab, and some members expressed their feelings even more strongly. In 1971, Bell, supported by Goldwater and Fulton, had this to say in "Additional Views" attached to the committee report:

There is equipment in inventory which would permit follow-on Skylab activity at a minimal additional investment. Furthermore, there are numerous productive experiments which could be flown, particularly in the area of applications.

Similar views, with strong minority support for both extending Skylab missions and speeding up the Shuttle, were expressed by Winn and Price, and endorsed by Frey, Goldwater, Camp, and Fulton.

The enthusiasm of the House committee for a second series of Skylab missions, plus progress toward a space station, did not meet the same response in the Senate. The "other body", as House Members by tradition and courtesy referred to the Senate during formal debate, simply declined to make any changes whatsoever in either the budget or substance of the Skylab program. The Senate report in 1971 bluntly stated:

Your committee does not agree with the position taken by the House of increasing funds (for Skylab). NASA has testified that they have no intention of going forward with a second Skylab. Therefore, your committee feels that the additional \$45 million is unnecessary.

When the conference committee met, the Senate conferees stood firm in their opposition to a second Skylab series. It was all the House conferees could do to get the Senate to agree to adding \$15 million for Skylab rescue capability. The action of the conference committee doomed the Skylab series to end after the 1973 flights.

Following the conference committee meeting, Teague, as chairman of the Manned Space Flight Subcommittee asked the Subcommittee on NASA Oversight in October 1971 to do a review and status report on both Skylab and the Space Shuttle. The report was based on extensive visits to contractors and installations in the field. The optimism expressed in the report concerning costs, performance and scheduling proved fully justified by the actual results achieved when the Skylab missions were flown in 1973. At the time of the report, which was completed in January 1972, the committee was still holding out the option that it might somehow be possible to have a second series of Skylab missions. These hopes were dashed with the realization—a familiar story—that there simply wasn't enough money available for anything extra.

The Subcommittee on NASA Oversight which made the Skylab report included the following:

Democrats

Thomas N. Downing, Virginia,
Chairman
Olin E. Teague, Texas
Ken Hechler, West Virginia
Walter Flowers, Alabama
Charles B. Rangel, New York

Republicans

John W. Wydler, New York
Robert Price, Texas
Barry M. Goldwater, Jr., California
John N. Happy Camp, Oklahoma

"One of the most significant benefit-oriented programs of the space age" was the characterization applied to Skylab by NASA's Dale D. Myers in his 1972 testimony before Teague's Manned Space Flight Subcommittee.

1973—THE YEAR OF SKYLAB

Three successive and successful manned flights of 28, 59, and 84 days were followed very closely by the committee in 1973 and 1974 as the members assessed the achievements of Skylab. The three crews of Skylab astronauts orbited the Earth 2,475 times and traveled over 61 million nautical miles in space. On May 14, 1973, shortly after the unmanned Skylab workshop was launched, the meteoroid shield was torn away, and two solar cell arrays were lost. This meant that the valuable workshop was overheated and underpowered.

Eleven days after the first flight, astronauts Charles Conrad, Joseph Kerwin and Paul Weitz were launched to rendezvous with and repair the workshop. They demonstrated the ability of human beings to perform difficult repair and construction work in space. A portable sunshade was deployed and one of the solar arrays was freed.

On July 17, 1973, the first crew of Skylab astronauts appeared before a joint meeting of the House Committee on Science and Astronautics and the Senate Committee on Aeronautical and Space Sciences, with Chairman Teague presiding. The 1973 lineups of the full committee and the Subcommittee on Manned Space Flight were as follows:

Democrats

Olin E. Teague, Texas, *Chairman*
 Ken Hechler, West Virginia
 John W. Davis, Georgia
 Thomas N. Downing, Virginia
 Don Fuqua, Florida
 James W. Symington, Missouri
 Richard T. Hanna, California
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey
 William R. Cotter, Connecticut
 Mike McCormack, Washington
 Bob Bergland, Minnesota
 J. J. Pickle, Texas
 George E. Brown, Jr., California
 Dale Milford, Texas
 Ray Thornton, Arkansas
 Bill Gunter, Florida

Republicans

Charles A. Mosher, Ohio
 Alphonzo Bell, California
 John W. Wydler, New York
 Larry Winn, Jr., Kansas
 Louis Frey, Jr., Florida
 Barry M. Goldwater, Jr., California
 Marvin L. Esch, Michigan
 John N. Happy Camp, Oklahoma
 John B. Conlan, Arizona
 Stanford E. Parris, Virginia
 Paul W. Cronin, Massachusetts
 James G. Martin, North Carolina

SUBCOMMITTEE ON MANNED SPACE FLIGHT

Democrats

Don Fuqua, Florida, *Chairman*
 Walter Flowers, Alabama
 William R. Cotter, Connecticut
 Bob Bergland, Minnesota
 Bill Gunter, Florida

Republicans

Larry Winn, Jr., Kansas
 Alphonzo Bell, California
 John W. Wydler, New York
 Louis Frey, Jr., Florida
 John N. Happy Camp, Oklahoma



When Representative Don Fuqua (Democrat of Florida), center, became Chairman of the Manned Space Flight Subcommittee, he worked closely with Representatives Larry Winn, Jr. (Republican of Kansas) and Louis Frey, Jr. (Republican of Florida), right. Here they are shown (right) at NASA's Ames Research Center, California. At left is Martin A. Knutson of Ames and, second from left, Thomas N. Tate, committee staff.

At the close of the hearing where the first Skylab crew testified, Congressman Esch brought general agreement with his statement:

More than anything else, your flight demonstrates the need to have man in space. But for the last 12, 13 or 14 years, we have had a strange dichotomy in this committee and in NASA between manned and unmanned flights. Isn't it about time we get over that dichotomy, admit we need both *** an integrated system of manned and unmanned?

It fell to the Manned Space Flight Subcommittee to hold a public hearing on the investigation report on what had gone wrong with the shield and solar arrays in the first Skylab workshop. On August 1, 1973, Chairman Fuqua opened the hearing by noting that despite the criticisms contained in the investigative report by NASA "it is important, however, that we not forget the overwhelming success of the first Skylab mission, accomplished by the dedication and outstanding work of the Skylab astronauts and the ground team to turn a potential failure into an outstanding success." The subcommittee concentrated on the reasons why the meteoroid shield had not been designed to fit tighter to the tank of the workshop so that aerodynamic pressures

would not have torn it off after liftoff. The committee's objective was to make certain that both in design, test and inspections these errors not be repeated in future programs. The committee brought out the failure of forceful communication between the designer and the contractor who was carrying out the design; Fuqua characterized it as "almost like building a house and failing to hook up the plumbing in the bathroom."

In presenting the NASA program to the House of Representatives in 1974, the committee for the first time was asking no money for Skylab, but had an opportunity to express justifiable pride in the accomplishments of the \$2.5 billion program. The last manned Skylab flight of 84 days splashed down on February 8, 1974, conclusively proving that human beings could withstand extended stays in space and perform useful tasks. Reflecting on Skylab's accomplishments, Congressman Bell told his colleagues during the authorization debate in 1974:

Skylab gathered information on the Earth's resources and environment to help with such problems as air and water pollution, flooding, crop deterioration, and erosion.

Congressman Fuqua in 1974, labeled Skylab an "unprecedented success," adding:

From its unique vantage point in space—beyond the atmospheric veil of Earth—Skylab's sensors searched out and recorded new and far-reaching information about the solar system, the Sun, the Earth, and man himself.

In a letter to Sam Lindsey of Old Town, Fla. on July 23, 1979, Fuqua explained:

At the time that the Skylab development and launch was completed in May 1973, the design of the Space Shuttle was underway and planned for first launch in 1978. At that time the orbital life of Skylab was estimated to extend from 1979 to 1983, depending on assumptions as to predicted solar activity. It was also envisioned at the time of Skylab launch that the Space Shuttle would be available to support either a reboost of Skylab during reentry or a controlled deboost of Skylab during reentry into a remote location. However, since the time Skylab was launched, the Space Shuttle first launch schedule was slipped and the Skylab was reentered during the early portion of the previously predicted period.

With the advent of the Space Shuttle next year, we should be in a position to avoid random reentry such as that which occurred with Skylab.

Following some hysterically overblown news media warnings, Skylab fell harmlessly to Earth on July 11, 1979, primarily in the Australian outback, with some pieces falling into the Indian Ocean. Fuqua summed up some of the contributions of Skylab in his letter to Sam Lindsey:

Skylab was a particularly productive scientific program. It demonstrated that such space activities can be of enormous practical value to life on Earth. The program included over 50 scientific, technological, and medical experiments. There were high-resolution astronomical studies of the Sun at short wavelengths not observable from Earth, medical research associated with man's living and working in space for extended periods of time, and investigation and application of remote sensing to the location, measurement, and protection of Earth resources.

All told, the three crews spent 740 hours observing the Sun with telescopes and brought home more than 175,000 solar pictures. Such data are changing longstanding theories of solar physics and could lead to more practical use of the Sun's vast energy on Earth.

More than 46,000 photographs and 40 miles of data tape obtained by Skylab's Earth resources instruments have been used by government and industry for studies ranging from agriculture to zoology.

SCIENTIFIC EXPLORATION OF THE MOON

Between 1970 and 1972, when the Apollo program officially ended after the splashdown of Apollo 17 on December 19, 1972, the committee fought a losing rearguard action to try to extend the number of flights to the Moon. The committee argued that the equipment, personnel and facilities were all available, and therefore they should be used to capitalize on the investment of \$23.5 billion over a 11½-year period.

In 1970, the Manned Space Flight Subcommittee added nearly \$300 million to the President's budget, including funds for Apollo 18 and 19, which NASA eventually canceled when later budgets got tighter. Congressman Wydler interrupted a long and enthusiastic statement by Congressman Fulton, who was supporting the Moon flight increase, with this question:

I am wondering exactly how do we justify to the people the fact that we would have an Apollo 18 and 19? What are they going to do with them?

Fulton answered:

The technology developed in the space program has changed the lives of every one of us, and we shouldn't ridicule it. It has advanced the boundaries of human knowledge so far that if we begin to limit our horizons and not look ahead, to advance at the edge of the unknown, and if we prejudge it, we will still be sitting looking up at a green cheese Moon.

Wydler was still unconvinced:

I am just wondering what you are going to tell the general public when they say, why do you need Apollo 18 and 19 in addition to all the rest of it?

Fulton's response raised the specter of the Russian threat which had spurred the decision made in the early 1960's:

We have to get going on the planning and the long lead items or we are going to get caught again, just like we were in 1958. And I am simply not going to let the USSR get ahead of us once we beat them out.

Interestingly enough, Congressman Karth, who led the close and bitter fight against the Space Shuttle in 1970, said to Chairman Teague concerning proposed Moon flight increases by his subcommittee:

Now, let me say, Mr. Chairman, that I agree with the principle involved in what your Committee did insofar as it relates to the actions you took on Apollo and Saturn V production. * * * And I say that because here we are talking about a program that, Mr. Chairman, we have spent \$25 billion on. And now we want to discontinue it. That doesn't make much sense to me.

Although the House supported the big increases the committee wanted in 1970 to extend the Apollo program, the Senate balked at the increased amounts for manned space flight. A lively conference between the House and Senate resulted in a substantial increase in the Apollo authorization in 1970, but in later years the committee resigned itself to sticking pretty close to the budget.

Chairman Miller's campaign to stir up aerospace workers, scientists, and other space enthusiasts to lobby harder for the manned space program did produce a great deal of activity on Capitol Hill. The scientific community was split; some strongly favored greater emphasis on unmanned missions, while other scientists deplored the cancellation of Apollo 18 and 19. The President felt the additional flights were impossible because of budgetary limitations. In early September 1970, Chairman Miller received a flood of letters from all over the country, urging continuation of the Apollo program. Although sympathetic toward the manned space concept, Chairman Miller sagely observed:

However, the gain from these additional two missions must be balanced with the current NASA fiscal restraints.

He went on to defend the course of action which NASA was taking, in the context of the President's budget decisions, and delivered this parting shot at many of his correspondents:

Had your views on the Apollo program been as forcefully expressed to NASA and the Congress a year or more ago, this situation might have been prevented.

By hindsight, it seems unlikely that even the strongest and most adept mobilization of the supporters of more manned flights to the Moon could have successfully overcome the adverse feeling in the country in the early 1970's. Congress and the Nation could be persuaded to support Skylab, the Space Shuttle, and a modest level of activity by NASA in many other areas. But as the NASA budget was squeezed down to the plateau between \$3 billion and \$4 billion annually, it became obvious that manned flight would be restricted to Earth orbital activities. Von Braun's dream of a manned flight to Mars was not in the cards for the 20th century, at least.

THE COMMITTEE AND APOLLO IN 1971-72

Opening the hearings on NASA's authorization on March 2, 1971, Chairman Miller began by introducing Apollo 14 astronauts Alan Shepard, Stuart Roosa, and Edgar Mitchell, their parents, their wives, and then their children. Amid the glare of television lights, Chairman Miller pronounced:

We are opening hearings in the most crucial period of our space program. The decisions made based on these hearings will largely determine the direction and emphasis in our national space program in the 1970's.

A month later, when Chairman Teague had his Manned Space Flight Subcommittee visiting TRW Space Systems in Redondo Beach, Calif., he observed:

There is more pressure for the Federal dollar today than there has ever been since I have been in Congress—and it gets down to it's the easiest thing in the world to vote against the space program.

On May 3, 1971, Chairman Miller in an address to the Third International Conference on Space Technology in Rome, Italy, tried very hard to paint the bright side of the space picture, but he had to acknowledge with some realism:

The mood in our country is entirely different than it was in the past decade. The very success of the Apollo program has diminished the sense of urgency in space competition—at least in my country at the present time. The talk in the political arena is about new national priorities, not necessarily including the space program.

When Teague commented on the NASA authorization in his annual floor speech on June 3, 1971, he confessed:

The budget recommended to you today is a minimum budget. It is a budget that delays and defers programs which are in the national interest to move along at a faster pace. Three lunar exploration flights remain. Our ability to conduct lunar exploration is then at an end.

The committee's role in 1971 and 1972 was to insure that as many of the scientific experiments on the canceled Apollo flights as possible should be transferred to the concluding flights. Vigorous oversight was maintained to verify that safety and reliability were not sacrificed, and that the funds, personnel, equipment, and facilities being utilized for the Apollo flights were being transferred as quickly as feasible to future projects like Skylab and Space Shuttle.

On April 20, 1972, true to tradition, the committee brought the NASA authorization bill to the House floor on the same day that Apollo 16 astronauts John W. Young and Thomas K. Mattingly landed on the Moon. In an unusual move, Teague's Manned Space Flight Subcommittee recommended no increases over the NASA budget. The subcommittee's deliberations were thorough and wide-ranging. Teague, in presenting what was to be his last authorization

request as a subcommittee chairman, told his colleagues that the subcommittee action "was taken after the most extensive hearings ever undertaken by the Subcommittee on Manned Space Flight." If the hearings were extensive, the markup session, frequently long drawn-out and contentious, set a record for brevity in 1972. The following is the complete transcript of the markup by Teague's subcommittee:

Mr. TEAGUE. Gentlemen, what is your pleasure?

Mr. FUQUA. I will move, Mr. Chairman, unless Mr. Winn wants to move, that we report the budget request submitted, the \$1.58 billion, for manned space flight.

Mr. WYDLER. I second the motion, and suggest that we fight like the very devil to hold it, too. Because it is their lowest request; we know that.

Mr. TEAGUE. Shall we put in the report that the committee looked into it, that we think they came in with a minimum, very austere budget, and that we are supporting them?

Mr. FUQUA. And we should point out the budget is \$52 million less than last year.

Mr. FREY. And point out that this is the first time we have not come in above it, have not increased it at all. We have always in the past increased it.

Mr. TEAGUE. Mr. Winn, further discussion?

Mr. WINN. No further discussion, Mr. Chairman.

Mr. TEAGUE. The motion has been made that we report the \$1,580,652,000. Those in favor say "aye."

[Calls of "aye."]

Mr. TEAGUE. Opposed "no."

[No response.]

Mr. TEAGUE. The vote is unanimous. Let's go home.

* * * * *

APOLLO 17 AND CHAIRMAN MILLER'S RETIREMENT

On December 19, 1972, the Apollo 17 astronauts completed their journey to the Moon—the sixth manned landing and the last of the Apollo series. Dr. Harrison H. Schmitt, a trained geologist, became the first astronaut-scientist to make the Moon landing; he later joined another former astronaut, John H. Glenn, in the U.S. Senate.

The ending of the Apollo program almost coincided with the close of Chairman Miller's fruitful career, the last 11 years of which he served at the helm of the Science and Astronautics Committee. In the early years of his chairmanship, Miller was always compared favorably with his predecessor, Representative Overton Brooks, under whose chairmanship subcommittees automatically were held in tight rein. It was Chairman Miller's generous delegation of authority to Manned Space Flight Subcommittee Chairman Teague that enabled the most heavily financed aspects of NASA's space program to succeed so admirably in the leadership and oversight received from Congress.

In his own right, Chairman Miller pioneered in the establishment of the Science, Research and Development Subcommittee which came to its fullest flower under its first chairman, Congressman Daddario. Miller's deep interest in general science led to the broadening of the charter of the National Science Foundation, the legislation to establish the Office of Technology Assessment, and the movement toward converting the United States to the metric system.

In 1967, Chairman Miller was awarded the Robert H. Goddard memorial trophy for "his sustained leadership in the formulation and execution of national policy contributing immeasurably to the remarkable accomplishments of the U.S. space effort." Miller's adulation for Dr. Goddard, the acknowledged "father of American rocketry," is indicated by the fact that he arranged to have Goddard's portrait displayed in the main committee room, 2318 Rayburn, although the portrait of Representative Overton Brooks, the first chairman of the committee, is conspicuously absent.

Through Chairman Miller's leadership, the Panel on Science and Technology, begun by Chairman Brooks, was expanded and strengthened. An additional scientific panel, the Research Management Advisory Panel, also worked closely with the Subcommittee on Science, Research and Development and helped broaden the dialogue between scientists and Members of Congress.

Representative Wayne N. Aspinall (Democrat of Colorado), who served for two years on the Science and Astronautics Committee and later became chairman of the Interior and Insular Affairs Committee, had this to say about his fellow chairman:

I have always found George Miller to be understanding and friendly, ready for a light remark when it was in order and for a serious one when it was in order.

Chairman Miller ran his committee in a quiet and conversational sort of fashion, never flamboyant, given to occasional flashes of petulance or anger but not by nature combative, always unhurried and full of frequently lengthy anecdotes. In 1971, when the House leadership decided to make the Science and Astronautics Committee a non-major committee to accommodate members who wanted the chance to serve on an additional committee, some of the higher ranked members like Congressman Karth were angry with Chairman Miller. Miller's defense was that the move was made to accommodate members and to prevent wholesale defections from the committee. In any event, Chairman Miller's agreement was characteristic of his general approach toward both the House leadership (a team-playing spirit of cooperation) and toward his own committee members (to favor and accommodate those committee members who were team players rather than mavericks).

His colleagues in the Congress respected Chairman Miller. They listened intently, and applauded vigorously as he interrupted debates on any issue to announce the latest successes in manned or unmanned space flight.

Chairman Miller pioneered in building strong relationships with leaders of science in other nations. He sponsored the establishment in 1971 of a new Subcommittee on International Cooperation in Science and Space. He traveled more extensively than any other committee member, and from Stockholm to Sydney, Rome to Romania, he was always eager to board a plane to deliver an address and cement relationships with those interested in scientific development abroad. At the age of 80, Chairman Miller made a special trip to the South Pole at the special invitation of the National Science Foundation. And he swelled with natural pride when the National Commission on Geographical Names in September 1972, designated an extensive range of high plateau in Antarctica as "Miller Bluffs."

Exactly one week after the Apollo 17 astronauts had splashed down to mark the end of the last manned flight to the Moon in the Apollo series, Chairman Miller wrote a farewell letter to NASA Administrator Fletcher. He observed:

The conclusion of the Apollo program leaves me with very mixed feelings indeed. As I look back over the years to 1959, when the American people committed themselves to the exploration of space, I am struck with a deep sense of quiet, profound pride at what we have accomplished, especially in manned space flight. * * *

The plethora of benefits of our program going directly to people today and to generations to come are, to me, immeasurable, but nonetheless real. And they are rooted in almost every discipline—medicine, geology, geodesy, astronomy, planetary physics—the list is much too long to enumerate. It is results such as these that vindicate and highlight the faith in the promise given to the American people at the very beginning of the space program in 1959. * * *

I depart from the Committee on Science and Astronautics with boundless pride and satisfaction with the signal success of the relationship between NASA and the Congress. I will watch in the years to come for even greater results that will undoubtedly come from that warm, cooperative effort.

TEAGUE SUCCEEDS MILLER

With the beginning of the 93d Congress in 1973, Representative Olin E. "Tiger" Teague moved up to assume the chairmanship of the Science and Astronautics Committee, a position he held for six years until his voluntary retirement from Congress. Following Chairman Miller's defeat in the California Democratic primary in June 1972, Teague slyly attempted to build up a little suspense over whether he would give up the chairmanship of the Veterans' Affairs Committee to move over to the more prestigious Science Committee. When it became apparent that he would do so, he then predicted darkly that

the McGovern ticket might cause the Republicans to capture control of Congress and thus switch the chairmanship to Representative Charles A. Mosher (Republican of Ohio). Some NASA officials were apprehensive lest the next Democrat in line, Hechler, might move up, because he had taken somewhat critical positions on NASA's programs. But according to a Washington Post article following the November 1972 elections, Hechler personally urged Teague to give up the Veterans' Affairs chairmanship in order to take the Science chairmanship.

One of Chairman Teague's first decisions was to find a new executive director. As Teague explained it:

Ducander and I had an understanding before I became Chairman that he wasn't going to stay because I felt like you had to have a technical man for staff director.



Chairman Teague (center) meets with Apollo 13 astronauts, John L. Swigert, Jr. (left) and James A. Lovell, Jr., in his Capitol Hill office.

Teague found his man in John L. "Jack" Swigert, Jr., command module pilot on the April 1970 Apollo 13 flight which had been forced to return to Earth after an oxygen tank had ruptured. A graduate of the University of Colorado, Swigert had obtained a master of science degree from Rensselaer Polytechnic Institute, and a master of business administration degree from the University of Hartford. In addition to serving as an Air Force fighter pilot in Japan and Korea, Swigert had been an engineering test pilot for North American Aviation and also Pratt and Whitney. In making his appointment effective on April 24, 1973, Teague stated:

Jack Swigert brings to the Committee on Science and Astronautics a broadly based experience, skill and enthusiasm that will aid in the expanding effort being made by the Committee to assure that our national space program and federal research and development will receive adequate support in the mid-1970's.

Teague's interest in having a staff director with technical background he explained this way:

When NASA came up here to testify with Jack Swigert here, I'm telling you, they were careful about what they said.

Prior to joining the staff, Swigert was the subject of a feature article in *The New York Times*, at the time of the Apollo 13 flight, with a four-column headline reading: "Swigert, 38, Had Girl In Every (Air)Port." As the first bachelor to fly in space, Swigert was characterized as "a man who carries several reputations with him wherever he goes—swinger, student, sportsman, and systematizer." The word "systematizer" was applied because he "likes things neat, in their place." The article explained:

"When he cleaned out my freezer one time," his sister recalls, "he had all the juice cans lined up, with the lemonade before the orange juice. He said he did it that way because L comes before O."

Swigert employed the same style of systematic approach to organizing the committee staff. Under his direction, the staff members were grouped into "task teams" to tackle broad problems arising in several categories, so that if a subcommittee staff member completed work on one problem he could move on to work on another subject matter within the task team.

In the four years and four months Swigert was executive director, the committee staff grew steadily in size, taking a quantum jump when the committee jurisdiction expanded, starting in 1975. Upon Swigert's arrival in 1973, there were 22 members of the staff, and when he left in August 31, 1977, to start an unsuccessful campaign for the Republican nomination to the U.S. Senate in Colorado, the staff had grown to 79.

THE FOUR CHAIRMEN OF SPACE SCIENCE AND APPLICATIONS

1. Representative Joseph E. Karth of Minnesota

Karth was the longest reigning and first chairman of the Subcommittee on Space Science and Applications. During the period of his chairmanship from the early 1960's until his departure to join the House Ways and Means Committee in October 1971, Karth championed the applications side of NASA's work. As noted in chapter VII, Karth provided strong leadership in his subcommittee and on the full committee to furnish more support for the Earth resources technology satellite program (later renamed "Landsat"). Within two months of the first manned landing on the Moon, Karth, in September 1969, bluntly told a Princeton University symposium:

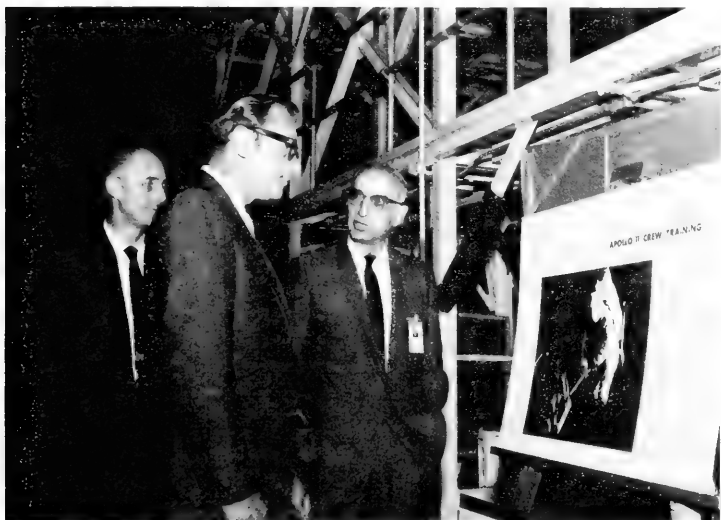
I predict that the pressure on Congress to reduce the space budget still further will increase unless the future orientation of NASA is based less on space spectaculars and more on the production of tangible and economic benefits.

In January 1970, Karth challenged the members of the American Astronautical Society:

I am convinced that now we should more aggressively pursue the many potential applications of existing space technology to practical problems of Earth.

Karth deplored the fact that space applications in 1970 constituted a meager 5 percent of NASA's budget, and he continued to attack the recommendations of Vice President Agnew's Space Task Group for huge new manned programs in the 1970's. Karth advised his House colleagues during the NASA authorization bill debate on April 23, 1970:

I think I can speak for all the members of our subcommittee in stating to the House that we feel strongly that the space applications program—the practical, end-result, benefits-on-earth type of space activities—needs greater emphasis and attention than it has had in the past.



Representative Joseph E. Karth (Democrat of Minnesota), center, discusses Apollo flight training at Johnson Space Center, Houston, Tex. At left is Joseph G. Gavin of Grumman Aircraft Corp., and at right Aleck C. Bond of NASA.

In the face of heavy adverse pressure from Chairman Miller and Manned Space Flight Subcommittee Chairman Teague, Karth fearlessly plunged ahead with his crusade on behalf of space applications. He did not cease his efforts once the hearings and authorization bills had been passed. Karth hit the luncheon circuit in a series of sharp public

addresses, sounding the alarm on behalf of people programs instead of manned space spectacles. Before a largely unfriendly audience at a luncheon meeting of the American Institute of Aeronautics and Astronautics, held at Fort McNair in Washington, D.C. on April 1, 1971, Karth was at his best:

The people of our country, the taxpayers, find it difficult to see the relevance of the space program to the whole sweep of our economic and social problems. And because some refuse to say it at all, I'm persuaded to say it more often. Our citizens are clamoring for a reordering of our priorities, and unfortunately space doesn't seem very high on their list. We may not like the facts, but that is no excuse for being so stupid that we can't recognize them.* * *

I have urged for the past six years that we place equally strong emphasis upon those activities in space that will result in economic payoff for our people. Specifically, I have urged an increased effort in applications satellite systems—communications, meteorology, earth resources survey, navigation and air traffic control.

Karth pointed out that too much of NASA's effort was devoted to applying space benefits to help individual consumers, like the development of teflon frying pans. He observed:

Unfortunately, it seems to me that our most pressing problems today are *not* those of individuals, so much as they are those of communities and institutions. While the individual's standard of living has improved, the quality of life has deteriorated. The American housewife now has teflon frying pans, but we stand by helplessly while Lake Erie dies (and) the people of Los Angeles suffocate in smog. * * * Somehow we need to address the problems of mass transportation, of pollution of our atmosphere and our fresh water resources, of urban renewal.

Karth's subcommittee strongly supported his personal emphasis on space applications and people-oriented benefits. In 1971, the following members served on the Subcommittee on Space Science and Applications:

<i>Democrats</i>	<i>Republicans</i>
Joseph E. Karth, Minnesota, <i>Chairman</i>	Charles A. Mosher, Ohio
Thomas N. Downing, Virginia	Larry Winn, Jr., Kansas
James W. Symington, Missouri	Robert Price, Texas
John F. Seiberling, Jr., Ohio	Barry M. Goldwater, Jr., California
Morgan F. Murphy, Illinois	

In his farewell address on the NASA authorization bill in 1971—the last subcommittee report he handled before going over to the Ways and Means Committee—Karth on June 3, 1971 told the House once again that every year since the mid-1960's, his committee had emphasized the need for greater priority treatment of space applications. He added:

I would like to take this opportunity to recommend to the new Administrator of NASA, Dr. James Fletcher, that serious consideration be given to reorganizing

the Space Agency to include a new Office of Applications to be headed by an Associate Administrator of Applications. In this way, we may achieve a new direction for our space program with appropriate emphasis on practical applications until it becomes a reality.

Although Karth did not remain on the committee long enough to see the change made, NASA finally did decide on December 3, 1971, to set up the very office which Karth recommended.

Exactly a week after Karth transferred to the Ways and Means Committee, Representative Thomas N. Downing (Democrat of Virginia) sent the following note to Chairman Miller:

DEAR MR. CHAIRMAN: Now that Joe Karth has transferred to the Ways and Means Committee, I would deeply appreciate your giving me consideration to my being named as Chairman of the Subcommittee on Space Science and Applications.

I would consider this a challenging assignment and I would very much like to try it.

Sincerely,

/s/Tom.

This was a little ticklish for Chairman Miller, who was a stickler for following the seniority system. Under ordinary circumstances, Hechler, who was next in line by seniority to Karth, would have had the option to move up from his chairmanship of the Subcommittee on Advanced Research and Technology to take over the Karth subcommittee, a move which Chairman Miller did not view with relish. If Karth had been a troublemaker by using the Applications issue, there was no telling what would happen if the subcommittee fell into the hands of a real maverick like Hechler. And as if there weren't enough problems, Fuqua asked Miller whether it would be possible to split the old Karth subcommittee and pave the way for Fuqua to become chairman of a new Applications subcommittee.

Chairman Miller decided to cool it for a few months. After all, no hearings were scheduled until January of 1972, and the situation might work itself out if there were some delay. Informal soundings were made to see whether Hechler intended to insist on his seniority rights, which would have produced a sticky situation. Hechler surprised his colleagues by opting to stay exactly where he was, thus paving the way for Downing to chair the old Karth subcommittee. Chairman Miller then told Fuqua that since there was one line item in the NASA authorization bill for Applications, that it would probably be best to keep Space Science and Applications together in one subcommittee. Delay had served the useful purpose of eliminating the potential conflict among competing aspirations. Miller did not announce his decisions until the new session of Congress convened in January 1972.



Representative Thomas N. Downing (Democrat of Virginia) meets with Skylab astronauts. From left, Alan Bean, Downing, Jack R. Lousma, and Dr. Owen K. Garriott.

2. Representative Thomas N. Downing of Virginia

Congressman Downing, a product of the Virginia Tidewater and lifelong resident of Newport News, Va., is the very epitome of a southern gentleman of the old school. One can picture him riding with the hounds, his 6-foot frame dominating the scene near white-columned mansions, as southern belles with long, flowing dresses sip mint juleps on a wide veranda. Amid the conviviality of a story-telling evening, it seemed natural for Downing to launch into an impassioned plea to restore Gen. Robert E. Lee's citizenship and pass his bill to correct a century-old injustice—which is precisely what Congress got around to doing.

Elected to Congress in 1958 with a huge class of newcomers which also included Karth, Hechler, and Daddario, each of whom ascended to subcommittee chairmanships early in the 1960's, Downing did not join the Science Committee until 1962. This meant he had to wait his turn until 1971 before getting his own subcommittee. He was then named head of the Oversight Subcommittee, and moved up to the chairmanship of the Space Science and Applications Subcommittee in 1972. After he had announced in 1976 that he planned to retire from Congress at the end of that year, Speaker Albert persuaded Downing to take the chairmanship of the Select Committee on Assassinations for the last few months of 1976.

A graduate of the University of Virginia Law School, Downing won a Silver Star as a mechanized cavalry troop leader with General Patton in France, where he commanded the first troops to invade Germany in 1944. "Historically, the man who represents my district has to get on the Merchant Marine Committee," Downing relates. The location of the Newport News Shipbuilding and Drydock Co., Virginia's largest employer, was one of the reasons Downing originally applied for and was appointed to membership on the Merchant Marine and Fisheries Committee. There he developed a close friendship and working relationship with Miller and Karth, who also served on that committee.

The presence of Langley Research Center and Wallops Station, NASA installations in Downing's district, caused him to seek and obtain membership on the Science Committee in 1962. There he rose in seniority on Karth's subcommittee, as well as on the Subcommittee on NASA Oversight. A staunch conservative in contrast to Karth's liberalism, Downing worked closely with Karth and supported him on all the major decisions made by the subcommittee.

There was a reshuffling of personnel on the Space Science and Applications Subcommittee after Karth left the chairmanship and Downing took over in the middle of the 92d Congress in January 1972. The following served under Downing's chairmanship during 1972:

<i>Democrats</i>	<i>Republicans</i>
Thomas N. Downing, Virginia, <i>Chairman</i>	Robert Price, Texas
James W. Symington, Missouri	Larry Winn, Jr., Kansas
John F. Seiberling, Jr., Ohio	Barry M. Goldwater, Jr., California
Morgan F. Murphy, Illinois	R. Lawrence Coughlin, Pennsylvania
Mendel J. Davis, South Carolina	John N. Happy Camp, Oklahoma
Bob Bergland, Minnesota	

As a subcommittee chairman, Downing's style differed from Karth's. He was inclined to be more courteous and tolerant toward witnesses, and perhaps less incisive in the type of combative questioning which Karth pursued. But like all chairmen of the Subcommittee on Space Science and Applications, he placed heavy stress on NASA's need to place a higher priority on programs for the benefit of all mankind. In his first subcommittee report to the full committee, Downing deplored the fact that NASA was stressing "certain expensive scientific projects" instead of putting more money in applications. He added:

For several years the Subcommittee has urged NASA to give greater emphasis to Space Applications. These recommendations have been largely disregarded by NASA.
 * * * The announcement of the creation of the Office of Applications was greeted by

enthusiasm by many in Congress who have long believed that public support for the national space program in the future will depend very heavily upon these practical applications of space technology.

While supporting NASA's efforts in space science, including such projects as the Orbiting Solar Observatory and the Orbiting Astronomical Observatory, Downing voiced strong support for less expensive suborbital programs through the use of balloons and sounding rockets. He reported and supported a big jump in Space Science funding in 1972 to build and equip the two Viking spacecraft which so successfully orbited and soft-landed on Mars in the bicentennial year of 1976. But he told his colleagues during the authorization bill debate in 1972:

It is my conviction that the current level of funding for space applications is inadequate, and I intend to urge a substantial increase in the budget. * * * NASA's stated goal of increased emphasis on space applications can be achieved only if sufficient financial support for this work is forthcoming.

Downing remained as subcommittee chairman through 1972, after which he was succeeded by Representative Symington.

3. Representative James W. Symington of Missouri

Paraphrasing Kipling, Congressman Symington is the kind of person who walks with kings without losing the common touch. As President Johnson's Chief of Protocol, his experience covered not only kings, but all foreign heads of state and visitors plus a good cross section of American dignitaries visiting the White House. Only Symington would have the common touch to grasp a fellow-Congressman's arm and plunge into a crowd of young protesters, as we prepared, in black-tied splendor to enter the Century Plaza Hotel in Beverly Hills, Calif., for a lavish dinner President Nixon was throwing for the first astronauts to land on the Moon. The protesters demanded that we tell them, as Symington expressed it, "Why the Moon with so much left to do on Earth in housing, pollution, and education?" For a full hour we talked with them and achieved the goal of communication. Writing in his book, *The Stately Game*, Symington relates:

We went on to discuss space technology and its relevance to earthbound life: the weather satellites, which give advance warning of impending storms; the communications satellites, which can bring education and new knowledge into the remotest parts of the world; the earth resources satellites, whose infrared sensors may soon tell us far more about the subsurface of the Earth than we know today, telling farmers what and where to plant and fertilize and fishermen where the schools are headed.



Representative James W. Symington (Democrat of Missouri), right, with Soviet Cosmonaut Alexei A. Leonov.

The son of a Democratic U.S. Senator, grandson of a Republican Senator, and great-grandson of a Secretary of State, Symington enjoyed a rich variety of opportunities before coming to Congress—Marine, member of the soccer and boxing teams at Yale, Columbia Law School graduate, professional musician (guitar) and nightclub performer, assistant city attorney in St. Louis, special assistant to an ambassador (London), administrative assistant to Attorney General Robert F. Kennedy, deputy director of food-for-peace program, and executive secretary of President's Commission on Juvenile Delinquency and Crime.

Within the broad area of applications, Symington is best remembered for the extremely vigorous support he gave toward faster development and more user interest in Earth resources technology satellites (later termed Landsat). During his second term in Congress, Symington was chosen to be the Moderator of the 13th meeting of the Panel on Science and Technology, January 25-27, 1972, which was devoted to the subject of "Remote Sensing of Earth Resources." This proved to be the last Panel meeting before the Panel was abandoned by Chairman Teague. In both his opening, welcoming remarks and in his summary statement at the end of the three-day meeting, Moderator

Symington had a chance to spotlight the importance of hurrying along with the development and use of Earth resources satellites. At one point in the proceedings, spying Congressman Karth in the rear of the audience, Symington modestly observed:

I would like to call attention to the fact that we are graced at this time by the presence of the former chairman of the Space Science and Applications Subcommittee, Congressman Joseph Karth of Minnesota, who is sitting benignly in the back when he should be here chairing these proceedings.

He has done a great deal over the past years to stimulate the work of this committee and this panel. Congressman Karth was, somewhat like Elijah, drawn up to the Ways and Means Committee from this terrain, where he now serves with great distinction.

When he assumed the chairmanship in January 1973, Symington was assigned the following members to his subcommittee:

<i>Democrats</i>	<i>Republicans</i>
James W. Symington, Missouri, <i>Chairman</i>	Marvin L. Esch, Michigan
Thomas N. Downing, Virginia	Larry Winn, Jr., Kansas
Bob Bergland, Minnesota	Barry M. Goldwater, Jr., California
George E. Brown, Jr., California	John N. Happy Camp, Oklahoma
Dale Milford, Texas	

Symington, a literary master of the bon mot, regaled his listeners and readers with the best prose which was ever developed on the Science Committee. Serving successively as chairman of the Subcommittees on International Cooperation in Science and Space, Space Science and Applications, and Science, Research and Technology, Symington not only provided vigorous leadership but also attracted the support and esteem of scientific experts throughout the world. The dialogue with the scientific community was lifted to a new level through his smooth handling of complex and technical issues espoused by those approaching genius in the areas of science and technology.

In opening the first Space Science and Applications Subcommittee over which he presided, Symington on March 1, 1973 paid tribute to the efforts of his two predecessors, Karth and Downing for their support of a "more aggressive and vigorous applications program", adding:

I would like to take this opportunity to add my voice to theirs, and to note that there is no NASA activity which is better understood or more widely supported by the American public than the applications program.

Both Symington and Bergland jumped on NASA witnesses for not expressing sufficient enthusiasm for solar energy conversion. Bergland put it this way:

I don't like to sound like an alarmist, but * * * within ten years' time, qualified experts in the field tell us we will see 75 cents a gallon gasoline in the United States. * * * Mr. Chairman, I submit that we simply can't afford to proceed with such a token effort in the field of solar energy conversion.

Symington also needed NASA witnesses on why so many budgetary reductions were made in NASA's applications program. This prompted the following exchange with Charles W. Mathews, head of the Office of Applications:

Mr. SYMINGTON. Was that decision occasioned by an overall budget review, as distinct from a purely Agency decision?

Mr. MATHEWS. That sort of thing, Mr. Chairman, generally would occur as a somewhat iterative process.

Mr. SYMINGTON. Repeat that word?

Mr. MATHEWS. Iterative. That means a back and forth process.

When a subsequent discussion revealed that the process ended up with NASA always recommending less money in the Applications area, Symington was prompted to observe: "Who put the 'it' in that iterative process?"

Appalled by the failure of NASA to budget for a navigation satellite also desired for use by the Maritime Administration, Symington had this sprightly colloquy with Mathews:

Mr. SYMINGTON. So they want it very badly, and you would like to give it to them, but it's not in either budget?

Mr. MATHEWS. That is correct.

Mr. SYMINGTON. That is confusing to me.

Mr. BERGLAND. Mr. Chairman, I submit it doesn't make any sense.

Mr. SYMINGTON. The gentleman has expanded my thought. * * * Was there a third silent partner in the decision by these two great agencies not to place this item in their respective budgets?

Mr. MATHEWS. Usually that happens when there are two agencies involved.

Mr. SYMINGTON. Divide and conquer, or unite and conquer in this case.

There were a great many aspects of NASA's programmed budget which Symington in 1973 labeled as "incredible." First, Dr. Fletcher announced that the establishment of a separate Office of Applications meant that Applications would be given greater emphasis in the future; yet the budget request in 1973 was only \$153 million as contrasted with \$195 million in 1972. Then there was the little item of phasing out NASA research on communications satellites, when the Communications Satellite Corporation through private industry indicated no desire to pick up that big tab. When NASA decided to delay the launch of another Earth resources technology satellite for budgetary reasons, Symington's subcommittee stepped in and added \$8 million to NASA's authorization to speed up this valuable program. His efforts were unanimously supported by both his subcommittee and the full committee, with strong assistance in the debate by Downing, Esch, Goldwater and Camp.

It had been the practice of most subcommittees to accomplish their major assessments of agency programs through the annual authorization hearings, plus oversight through field visits and careful analysis

during the year. Symington added a new twist to this process in 1973 by calling a series of four "informal briefings" between September 24 and October 4. The briefings were designed to ascertain progress, technical difficulties, costs, launch schedules, and any program changes. The briefings also enabled Symington and his committee to reiterate their strong support for the entire Applications program, and specifically satellites like ERTS.

Symington and Esch put some more heavy pressure on NASA to speed up the launch of an additional ERTS satellite, which Congress had authorized. The conversation went like this:

Mr. MATHEWS. We are still actively pursuing your desire to accelerate ERTS-B—

Mr. ESCH. It seems ridiculous to me if the Congress mandates a position and proposes it through the Authorization Committee, that NASA cannot respond. * * * It would seem to me that if NASA is doing its job they would be asking for supplemental appropriations, if necessary, or asking how to implement the appropriation so it will be expedited. * * * I would like to know how we can help you convince the Administration and the other NASA officials that Congress means this. Do you think maybe we ought to have a GAO report, for instance?

Mr. MATHEWS. I think that both NASA and others in the Executive Branch of the Government fully understand the Congressional position on this point and the fact that it is a strong position.

Mr. SYMINGTON. It seems anyone with a grain of sense would want to keep the momentum going and operating. I do think you ought to take a strong message back, that I think a lot of people felt this thing was going to be on track. They didn't realize that it was getting off again.

Mr. ESCH. I'm just very much concerned * * * that something as highly successful as this would be caught in the bureaucratic bowels of OMB or NASA.

As was customary in any Symington hearing, everything was not completely sober and serious. At one point the colloquy went like this:

Mr. CAMP. Have you done any work with windmills?

Mr. MATHEWS. My office has not, but the Office of Aeronautical and Space Technology has been working on it.

Mr. SYMINGTON. The Congress is said to contribute in this area.

Mr. MATHEWS [diplomatically]. I think a lot of positive energy is produced by the Congress.

Although more sparks flew during the Applications hearings, Symington spent considerable time in bringing the subcommittee up to date on recent developments in the space science field, including lunar and planetary programs as well as physics and astronomy. One day when Vincent Johnson of the Space Science Office was discussing "comets that we know are coming back that we do want to intercept and rendezvous with," this prompted Symington to relate:

It reminds me of the story of a little boy who is asked, to test his intelligence, what he would do if he saw a train coming down the track from the north at 70 miles an hour and about three or four miles away he could barely see, but certainly hear, a train coming from the south at about 50 miles an hour. The professor asked the boy, "What would you do?" and the boy responded: "I would call to my brother."

"Why would you do that?" the professor wanted to know.

"Because he has never seen a train wreck like that before."

In 1974, the Symington subcommittee continued to stress support of Applications, as well as continued funding of space science projects. The subcommittee was enthusiastic about the results achieved and data obtained from communications and weather satellites, the Earth resources surveys, and programs for monitoring pollution. In addition, the subcommittee under Symington helped fund the highly successful Applications Technology Satellite-6 which communicated education and health services information to millions of people, via television, in India and remote areas of the United States such as Alaska. During its 1974 markup, the Symington subcommittee adopted an amendment by Congressman Winn authorizing NASA to set aside \$2 million for research on tornadoes and other short-term weather phenomena.

Reflecting in 1978 on his experiences with the committee, Symington related that one of the most crucial decisions he had to make concerned the Viking program—by far the most expensive and most complex unmanned project authorized by the committee for a 1975 flight to Mars. Two spacecraft, each containing an orbiter and a soft lander, also included a biomedical package designed to perform a number of tests with Martian soil to ascertain the possibility of life on Mars. The total program exceeded \$1 billion in cost, and Symington's subcommittee soon discovered that the costs were escalating far beyond the preliminary cost estimate of \$346 million. After personal visits to the contractors and NASA's field installations, Symington's subcommittee decided that in view of the heavy cost overruns, oversight hearings should be held on November 21 and 22, 1974 "to determine the nature of these development problems, and why they were unexpected at such a late stage in the Viking project." Symington announced at the opening of the oversight hearings:

We shall also review the financial history of the project, and seek an expert assessment of the probability of mission success.

Symington vividly recalls the nature of the big decision he and his subcommittee had to make. Everything was in readiness to meet the Mars "window" for launch in the summer of 1975, except the biomedical package—a highly complex and super-miniaturized set of delicate instruments which had been packed into a box one cubic

foot square, capable of performing what customarily took up the space of several huge laboratory rooms on Earth. Symington relates:

The biomedical package was sterilized with intense heat to make sure no Earth-bound micro-organisms were carried to Mars, and this was one of the reasons the biomedical package wasn't ready and was behind schedule. They were having trouble with it, and finally we went out to look at it. Here I am an English major and a lawyer, and they showed me this black box with a lot of wiring in it. * * * Well, the question was: should we fly this thing with no assurance that the biomedical package is going to work, which was a package to test if there is life on Mars, and if it did not work, what is the sense of sending it up there?

Symington graphically described his dilemma: if it flies and doesn't work, "you have sent up a package for nothing". But if you don't fly because you are worried about the biomedical package, then you wait for the next Mars window about 26 months hence, which means a huge increase in the costs.

During the oversight hearings, Winn became exasperated with the parade of problems, cost increases, and complex technical difficulties which required costly new research while the development was proceeding:

I am telling you right now * * * I am going to start saying "no" to a lot of these programs. The American people are fed up with cost over-runs. If you look at some of the people in both parties, they campaigned on this issue. I am saying you guys are not going to be able to stick this stuff down our throats anymore.

Symington immediately added:

There is another dimension to Mr. Winn's point. From your testimony, it appears that you would have flown a 1975 mission if OMB had not stepped in to stop you, true?

Dr. Edgar Cortright of NASA responded circumspectly:

I can't remember whether OMB said that. I believe the Administrator made the judgment.

This prompted Symington to make the tongue-in-cheek response:

We know OMB has nothing to do with budget constraints. [Laughter.]

It was a serious oversight hearing, dealing with extremely complex dialogue on new forms of instruments which were to play a part in discovering and pushing back vast frontiers. Every now and then, Symington's somewhat puckish sense of humor bubbled to the surface. After a dreary recital of a long series of unanticipated delays, at one point Symington mused:

One way to delay the mission would be to require an environmental impact statement of the impact on Mars.

The Viking mission technically was perfect in execution. At 5:12 a.m. on July 20, 1976, the mission controller at the Jet Propulsion Laboratory in Pasadena, Calif. declared simply: "Touchdown. We have touchdown," as the first Viking lander smoothly reached the surface. Less than an hour later, Viking-1 began transmitting the first of an incredible series of photographs of the ridges, sand, bluffs and rocks on the surface of Mars. Later, long arms reached out from the spacecraft, scooped up and analyzed samples of the Martian soil and sent the results back to Earth. Two months later, Viking-2 landed at a different location on Mars. In the areas of landing, no unambiguous evidence of any form of life appeared to exist.

4. Representative Don Fuqua of Florida

Shortly after 10 o'clock one morning early in January 1975, Chairman Teague assembled the top senior Democrats of the committee for a very informal, unrecorded meeting in room 2317 of the Rayburn Building, the small anteroom adjoining the main committee room (2318). Going down the seniority list, Teague asked each member to choose the subcommittee of his preference. To nobody's surprise, when it came time for Fuqua to choose, he opted for the vastly expanded Subcommittee on Space Science and Applications, with jurisdiction over all of NASA's work except aeronautics. The committee had at first been dubbed "Space Flight, Science and Applications," which Fuqua with consent of the committee changed to its more permanent title.

By the start of the 94th Congress, the full committee which back in 1959 had perhaps 90 percent of its work dealing with NASA, in 1975 was devoting only about 20 percent of its effort in that area. Nevertheless, the greatly enlarged jurisdiction meant that Fuqua would preside over all the issues and programs once handled by two subcommittees (Manned Space Flight and Space Science and Applications) plus a portion of the work once handled by a third subcommittee (Aeronautics and Space Technology); the new Fuqua subcommittee took over jurisdiction dealing with tracking and data acquisition, technology utilization, and all forms of basic and advanced research once handled by the Hechler subcommittee. The work in aeronautics went to a new Subcommittee on Aviation and Transportation Research and Development.

At the opening of the 94th Congress in 1975, the following were the members of the Science Committee in order of seniority:

Democrats

Olin E. Teague, Texas, *Chairman*
 Ken Hechler, West Virginia
 Thomas N. Downing, Virginia
 Don Fuqua, Florida
 James W. Symington, Missouri
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey
 Mike McCormack, Washington
 George E. Brown, Jr., California
 Dale Milford, Texas
 Ray Thornton, Arkansas
 James H. Scheuer, New York
 Richard L. Ottinger, New York
 Henry A. Waxman, California
 Philip H. Hayes, Indiana
 Tom Harkin, Iowa
 Jim Lloyd, California
 Jerome Ambro, Jr., New York
 Christopher J. Dodd, Connecticut
 Michael T. Blouin, Iowa
 Tim L. Hall, Illinois
 Robert (Bob) Krueger, Texas
 Marilyn Lloyd, Tennessee
 James J. Blanchard, Michigan
 Timothy E. Wirth, Colorado

Republicans

Charles A. Mosher, Ohio
 Alphonzo Bell, California
 John Jarman, Oklahoma
 John W. Wydler, New York
 Larry Winn, Jr., Kansas
 Louis Frey, Jr., Florida
 Barry M. Goldwater, Jr., California
 Marvin L. Esch, Michigan
 John B. Conlan, Arizona
 William M. Ketchum, California¹
 Gary A. Myers, Pennsylvania
 David F. Emery, Maine

¹ Ketchum was replaced by Larry Pressler of South Dakota.

In 1975, the Subcommittee on Space Science and Applications included the following:

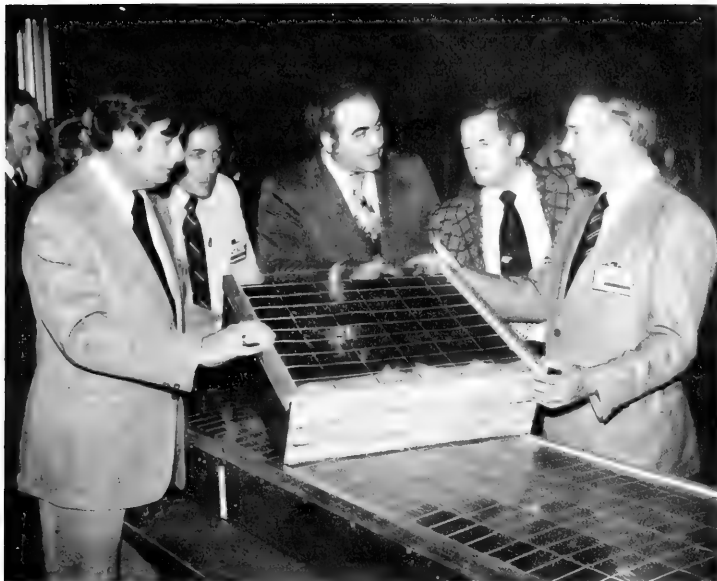
Democrats

Don Fuqua, Florida, *Chairman*
 Thomas N. Downing, Virginia
 James W. Symington, Missouri
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey
 Jim Lloyd, California
 Tim L. Hall, Illinois
 Henry A. Waxman, California
 Michael T. Blouin, Iowa

Republicans

Larry Winn, Jr., Kansas
 John W. Wydler, New York
 Louis Frey, Jr., Florida
 David F. Emery, Maine

Although under tremendous time pressure, Chairman Fuqua held almost nonstop hearings, field trips, and conferences from February 5 until just one month later when he assembled his subcommittee to mark up the NASA authorization bill in 1975. Not only was the subcommittee dealing with a vastly new area of jurisdiction previously handled by other subcommittees, but the members also had to wrestle



Inspection of solar heating panel. From left, Representative Don Fuqua (Democrat of Florida), John L. Swigert, committee executive director, Dr. Rocco Petrone of NASA, Representative William M. Ketchum (Republican of California), and Representative Larry Winn, Jr. (Republican of Kansas).

with funding a "transition quarter" to bridge the gap while the Government was moving its fiscal year from July 1 to October 1. Fuqua said:

We held some 23 different hearings, both here in Washington, and at NASA Centers, and with the key industrial contractors.

The Fuqua subcommittee also managed to take testimony during February from the Air Force, the European Space Organization, and the American Institute of Aeronautics and Astronautics. Winn, commenting on the thorough and speedy work, told his colleagues: "We have done as good a job as I have ever seen done." With Symington serving as a member of the Fuqua subcommittee, the transition was smooth to pick up the work and also carry through the emphasis Symington had placed on applications, indicated by this exchange during the subcommittee markup session:

Mr. WINN. The subcommittee is very aware of the importance of applications as a part of the new assignment in this committee, and the work that Mr. Symington and his subcommittee did in the past few years had not been forgotten. As a matter of fact, I think this subcommittee has benefited much by the work Mr. Symington's subcommittee did and we will follow through in that field of applications.

Mr. SYMINGTON. Thank you, gentlemen. I am glad I arrived in time.

In 1975, the Fuqua subcommittee put in a total increase of \$6.5 million, including severe storm research and earth resources surveys. In action supported by the Congress later, the Fuqua subcommittee directed NASA to "take a more affirmative approach to the planning of application missions with a view toward the ultimate user." The Fuqua subcommittee also put in a strong plug for additional work to bring down the costs on a large space telescope to accompany the Space Shuttle. The greatest emphasis, of course, throughout the 1970's was placed on speeding the development of the Space Shuttle, discussed in the preceding chapter. When the conference committee met, the House conferees persuaded the Senate to go along with the increase in applications research, and the conference report stated:

The committee of conference adopts the House position authorizing \$181,530,000 (for applications), emphasizing that the additional \$6,500,000 authorized is to augment and strengthen research and development programs in the area of severe storm research, earth resources development and Space Shuttle payload studies. The conferees also note the need for timely action to assure continuity of remote sensing of earth resources data from space.

Throughout his subcommittee chairmanship, Fuqua as well as all the members of the Subcommittee on Space Science and Applications continued to exert pressure on NASA to emphasize projects of practical benefit. At the same time, Fuqua and the subcommittee pushed NASA to accomplish more long-range planning of its objectives, and to pursue an aggressive program to share the knowledge acquired with the general public. Chairman Teague and Fuqua both felt that first NASA should plan its future objectives both realistically and with sufficient idealism, and then translate the programs clearly enough to win public support.

Midway in the first year of Fuqua's chairmanship of the subcommittee, he launched a series of productive hearings and reports entitled "Future Space Programs 1975." Between July 22 and July 30, 1975, scientists, industrialists, professors, physicians, economists, environmentalists, editors, management experts, and administrators paraded before the subcommittee in a truly mind-expanding experience. In September 1975, the subcommittee made its report, and Fuqua noted in his letter of submittal:

It is apparent that the imagination, skill and technology exist to expand the utilization and exploration of space. The positive benefits of a bold space program are compelling.

The report stated that NASA should demonstrate a sense of urgency in its future program planning and development. The subcommittee warned that the key element in future programs should be measured by the following yardstick:

Substantial return on past and current investments in space through clear and immediate benefits to the society on earth in the form of greatly expanded services and direct contributions to solution of earthbound problems.

The subcommittee stressed the need for more space systems for education and medical satellite services—like the highly successful Applications Technology Satellite which had been used for this purpose in India, Alaska, and other areas; and earth resources surveys. The report also made this recommendation:

NASA should develop and implement a comprehensive cost benefit analysis for each major program which will include the relative social and economic benefits as well as the potential for public support and international cooperation.

In 1976, the Fuqua subcommittee took several steps to implement the report. Following 27 hearings, the subcommittee recommended and Congress agreed to set up a new line item in the budget for "Earth resources operational systems"—the new Landsat satellite (which was formerly termed the Earth Resources Technology Satellite), and the user systems like the Departments of Agriculture and Interior. Among the other items recommended by the House subcommittee and approved in conference with the Senate was \$3 million to start work on the large space telescope.



Representative Wes Watkins (Democrat of Oklahoma), second from left, converses with three Speakers of the House, all of whom played a role in the formation of the Science Committee. From left, former Speaker Carl Albert of Oklahoma, whose resolution established the Science Committee; Watkins; former Speaker John W. McCormack, who chaired the select committee which created the Science Committee; and Speaker Thomas P. O'Neill, Jr., who authored the report from the Committee on Rules which established the Science Committee.

During the 95th Congress which started in 1977, the following Members served on the full committee:

Democrats

Olin E. Teague, Texas, *Chairman*
 Don Fuqua, Florida
 Walter Flowers, Alabama
 Robert A. Roe, New Jersey
 Mike McCormack, Washington
 George E. Brown, Jr., California
 Dale Milford, Texas
 Ray Thornton, Arkansas
 James H. Scheuer, New York
 Richard L. Ottinger, New York
 Tom Harkin, Iowa
 Jim Lloyd, California
 Jerome A. Ambro, New York
 Robert (Bob) Krueger, Texas
 Marilyn Lloyd, Tennessee
 James J. Blanchard, Michigan
 Timothy E. Wirth, Colorado
 Stephen L. Neal, North Carolina
 Thomas J. Downey, New York
 Doug Walgren, Pennsylvania
 Ronnie G. Flippo, Alabama
 Dan Glickman, Kansas
 Bob Gammage, Texas
 Anthony C. Beilenson, California
 Albert Gore, Jr., Tennessee
 Wes Watkins, Oklahoma
 Richard A. Tonry, Louisiana
 Robert A. Young, Missouri

Republicans

John W. Wydler, New York
 Larry Winn, Jr., Kansas
 Louis Frey, Jr., Florida
 Barry M. Goldwater, Jr., California
 Gary A. Myers, Pennsylvania
 Hamilton Fish, Jr., New York
 Manuel Lujan, Jr., New Mexico
 Carl D. Pursell, Michigan
 Harold C. Hollenbeck, New Jersey
 Eldon Rudd, Arizona
 Robert K. Dornan, California
 Robert S. Walker, Pennsylvania
 Edwin B. Forsythe, New Jersey

The Subcommittee on Space Science and Applications included the following:

Democrats

Don Fuqua, Florida, *Chairman*
 Robert A. Roe, New Jersey
 Jim Lloyd, California
 Thomas J. Downey, New York
 Ronnie G. Flippo, Alabama
 Bob Gammage, Texas
 Albert Gore, Jr., Tennessee
 Wes Watkins, Oklahoma
 Timothy E. Wirth, Colorado

Republicans

Larry Winn, Jr., Kansas
 Louis Frey, Jr., Florida
 Harold C. Hollenbeck, New Jersey
 Eldon Rudd, Arizona

EARTH RESOURCES INFORMATION SYSTEM

Opening three days of hearings in June 1977, on the Earth Resources Information System, Chairman Fuqua stated:

The number of users of Landsat data and the market for Earth resources information have increased dramatically. Many users have expressed great concern over the lack of commitment to insuring a continuing source of these data. In the minds of many persons the time has arrived to prepare for transition of Landsat from experimental status to an operational status. A policy needs to be established which outlines the respective roles of Government and industry.

The committee contracted with Charles W. Mathews, formerly NASA Associate Administrator for Applications, to synthesize the views of industrial firms, Government agencies and other individuals on the definition and structure for an Earth resources information system. Mathews produced two reports, one of the definition and scope of the system, and the second on the institutional arrangements required for a transition from an experimental to an operational system. The subcommittee then prepared a report recommending early and positive action to make Landsat a truly operational worldwide system.

Following the hearings, Fuqua suggested to Dr. Frank Press, Director of the Office of Science and Technology Policy, that the Federal Government should take a more active leadership role in "organization and communication" of the data developed. In a July 15, 1977 letter, Fuqua stressed that this was especially important for the private sector and state and local governments, which had expressed some dissatisfaction with the confusing lack of a central coordinating authority. Dr. Press replied on July 22 that he would establish a task group under the leadership of NASA Deputy Administrator Alan Lovelace for this purpose.

Once again, on November 29, 1977, Fuqua wrote Dr. Press, citing some of the significant issues in this area needing attention:

Clarification of agency roles, clarification of government/private sector roles, a commitment to provide continuity of data, a mechanism for user input to the Federal planning process, and enhanced technology transfer activities are needed in the near term. Furthermore, the Federal Government should commit to a 5-year Earth resources information system validation program with a stated goal of an orderly transition to an operational system.

Dr. Press responded on December 6, 1977:

The administration shares the sense of the Congress that remote sensing technologies can be of ever increasing benefit to the nation and the world, and is committed to a positive program that will advance these promising applications of space science and technology.

The subcommittee continued to place a high priority on development of a more active Earth Resources Information System.

On May 2 and 3, 1979, the subcommittee held hearings to review the progress being made by the executive branch in planning for an operational Earth Resources Data and Information Service, and to consider legislation for such a Service. Fuqua stated in opening the hearings:

There is good reason and evidence to be confident about the health and prospects of the technology of remote sensing and its use. The potential has been demonstrated in geology and oceanography, meteorology, land management, crop prediction, and a host of other disciplines. However, remote sensing of Earth resources involves a number of major policy issues, many of which are of an institutional nature.

On May 3, Fuqua observed:

The subcommittee is encouraged by a recent statement by Dr. Frank Press, head of the Office of Science and Technology Policy, that the administration is committed to an operational Earth resources system. However, no timeframe has been announced and there appears to be little progress in establishing a lead agency and assignment of roles and responsibilities to Federal agencies and little progress in defining the role of the private sector. No mechanism has been established to provide on a continuing basis input by users other than Federal users.

Brown was equally sharp in his reaction:

I think there may be a mismatch between NASA and at least some Members of Congress in the perception of the urgency with which we should move ahead in this area. * * * I think the executive branch needs to be pushed. That is my personal opinion.

FUTURE SPACE PROGRAMS

In 1977 and 1978, the Fuqua subcommittee demonstrated more sharply the difference in initiative between the legislative and executive branches. Despite declining budgets, the Ford administration and the NASA Administrator, Dr. James C. Fletcher, shared a clear understanding with the committee on the objectives and rationale of the space program. President Carter and his NASA Administrator, Dr. Robert A. Frosch, did not have the same rapport with the committee. The Fuqua subcommittee in particular was disappointed with the failure of high officials in the Carter administration to give inspiring leadership to the space effort.

When Dr. Frosch made his first appearance before the full committee on January 26, 1978, to discuss the future programs of NASA, he turned off some members with this comment:

I have been cast in some of the testimony as a conservative bureaucrat. I would like to submit that this is one of the roles I should be playing.

Fuqua reacted quickly:

One of the things that leaves me somewhat troubled is the lack of long-range planning and what seems to be a lack of more specificity in what may be the plans for the future.

Wydler declared:

These hearings have not given me the feeling of confidence that anybody is really trying to push the space programs for the future.

When Dr. Frank Press, head of the Office of Science and Technology Policy, generally echoed Dr. Frosch's theme, Congressman Winn, with some exasperation declared:

I don't quite know how to say this without sounding rude, and I don't mean it that way, but most of us on this committee are really excited about the space program and about our accomplishments. After listening to the testimony of you two gentlemen, you leave us very bored.

Fuqua jumped into the debate and asked the administration witnesses:

What are you talking about for the future? The administration was able to get along for a while saying "We are new and we're trying to formulate our policy." We are into the fourth quarter now and almost at the 2-minute warning, and we need to be getting on with the program of what we are going to be doing down the road.

In his floor statement urging adoption of the NASA authorization bill on April 25, 1978, Fuqua added:

The committee views with increasing concern the apparent lack of interest of the executive branch in consistent and continuous future planning for a strong national space program. * * *

When President Carter announced his new American Civil Space Policy on October 11, 1978, it also met a cool reception from Fuqua, who wrote to Dr. Press on October 20:

I am writing you this letter to express concern about the tone and content of the release. * * * It would be easy for the public to draw the conclusion that the American civil space policy will be maintained at its present dollar level or reduced.

Fuqua also raised questions about the speed with which crucial decisions were being made in a number of areas.

Despite the generally lackadaisical attitude displayed by the administration, Chairman Teague and the Fuqua subcommittee continued to press for better support for expanding applications, for more imaginative program planning, for development of a more thoroughgoing agenda for space industrialization, and a more inspired effort to give leadership to all the space programs across the board. The committee initiative may not have resulted in a wholesale beefing up of all the NASA programs, but at least there was a positive response among Members of Congress. On April 25, 1978, the House of Representatives passed the NASA authorization bill by 345-54.

THE COMMITTEE IN 1979

In 1979, the full committee included the following:

Democrats

Don Fuqua, Florida, *Chairman*
 Robert A. Roe, New Jersey
 Mike McCormack, Washington
 George E. Brown, Jr., California
 James H. Scheuer, New York
 Richard L. Ottinger, New York
 Tom Harkin, Iowa
 Jim Lloyd, California
 Jerome A. Ambro, New York
 Marilyn Lloyd Bouquard, Tennessee
 James J. Blanchard, Michigan
 Doug Walgren, Pennsylvania
 Ronnie G. Flippo, Alabama
 Dan Glickman, Kansas
 Albert Gore, Jr., Tennessee
 Wes Watkins, Oklahoma
 Robert A. Young, Missouri
 Richard C. White, Texas
 Harold L. Volkmer, Missouri
 Donald J. Pease, Ohio
 Howard Wolpe, Michigan
 Nicholas Mavroules, Massachusetts
 Bill Nelson, Florida
 Beryl Anthony, Jr., Arkansas
 Stanley N. Lundine, New York
 Allen E. Ertel, Pennsylvania
 Kent Hance, Texas

Republicans

John W. Wydler, New York
 Larry Winn, Jr., Kansas
 Barry M. Goldwater, Jr., California
 Hamilton Fish, Jr., New York
 Manuel Lujan, Jr., New Mexico
 Harold C. Hollenbeck, New Jersey
 Robert K. Dornan, California
 Robert S. Walker, Pennsylvania
 Edwin B. Forsythe, New Jersey
 Ken Kramer, Colorado
 William Carney, New York
 Robert W. Davis, Michigan
 Toby Roth, Wisconsin
 Donald Lawrence Ritter, Pennsylvania
 Bill Royer, California

The Subcommittee on Space Science and Applications in 1979 included the following:

Democrats

Don Fuqua, Florida, *Chairman*
 Ronnie G. Flippo, Alabama
 Wes Watkins, Oklahoma
 Marilyn Lloyd Bouquard, Tennessee
 Bill Nelson, Florida
 George E. Brown, Jr., California

Republicans

Larry Winn, Jr., Kansas
 Robert K. Dornan, California
 Ken Kramer, Colorado

On June 15, 1979, Darrell R. Branscome was named acting subcommittee staff director to replace James E. Wilson, who took a position with McDonnell Douglas Corp. With B.S. and M.S. degrees in mechanical engineering from Virginia Polytechnic Institute, Branscome had served at NASA's Langley Research Center and the NASA Headquarters. He started working for the committee in 1974, rising to



Among new members of Space Science and Applications Subcommittee in 1979 was Representative Bill Nelson (Democrat of Florida), who represents the district in which Kennedy Space Center is located.

become deputy staff director of the Space Science and Applications Subcommittee prior to being chosen as acting staff director with Wilson's departure. On October 24, 1979, he was named staff director.

Following its customary procedure, the subcommittee held three advance hearings in September 1978 on the NASA authorization, capped by 15 sessions during the first three months of 1979. NASA, the Air Force, the European Space Agency, and members of the industrial and scientific community testified on NASA-related programs.

In addition, the subcommittee on February 14, 1979, reviewed the President's civil space policy. At this hearing, Fuqua expressed his apprehension that NASA and OMB were projecting no new starts for several years:

I am very concerned that we are not looking down the road at new programs and where we are going, and we are dying on the vine. It is very alarming.

Wydler echoed this view, indicating:

What we are worried about here today is what is the program going to look like 10 years from now, with the decisions you are making today.

Referring to the gung-ho attitude which had prevailed in the 1960's, Wydler asked:

Would we be leading the world in space if we had followed this kind of approach that you are really now recommending for our country for the next decade?

In presenting the NASA authorization bill to the House on March 28, 1979, Fuqua reviewed the accomplishments of the Earth resources satellites (Landsats). He also called attention to the achievements, past, present and future, of the Voyager and Pioneer interplanetary spacecraft with relation to Jupiter and Saturn. But he pointed out that the value of NASA's 1979 effort in constant 1968 dollars had sagged to \$1,653 million—less than 50 percent of the 1968 buying power.

Aside from a brief skirmish over NASA funding of supersonic research, there was little opposition to the NASA authorization in 1979. The house rejected by 246-137 the perennial effort of Representative Ted Weiss (Democrat of New York) to cut the NASA effort by \$23 million for supersonic research. Then the House passed the bill on March 28 by a 323-57 vote. The conference report, adopted by the House on July 27, 1979, also supported two initiatives by the House:

- The addition of \$2 million, which had been cut out by OMB, to initiate development of a "Multi-Spectral Resources Sample"—an advanced remote sensor instrument for improved resolution and higher reliability.
- The addition of \$4 million to start development of a National Oceanic Satellite System.

During May and June 1979, the subcommittee held a series of hearings on Fuqua's bill to establish a Space Industrialization Corporation. In opening the hearings, Fuqua defined the objective of his bill:

To provide a means for financing the development of new products, processes, and industries using the properties of the space environment.

In the hearings, the subcommittee examined a number of issues associated with the prospects for commercial ventures in space, the role of the Federal Government, and the appropriate mechanism for fostering cooperation with the private sector.

TRACKING AND DATA ACQUISITION

From 1970 to 1974, jurisdiction over the tracking network was handled by the Subcommittee on Advanced Research and Technology (later renamed "Aeronautics and Space Technology"), and after 1975 jurisdiction passed to the Subcommittee on Space Science and Applications.

In reviewing the tracking network budget, which amounted to approximately \$300 million annually, the subcommittees through oversight and field visits attempted to ascertain how a greater degree of efficiency could be instilled into the NASA operation. Most of the top officials administering the tracking network were veterans of long

service with the National Advisory Committee for Aeronautics, they were a proud group, and it was difficult to penetrate the veil of self-protection which occasionally surrounded the group. To suggest in the abstract that money could be saved through automation and computerization was frequently met with the NASA argument that new equipment was needed. In general, the efficiency of the network operations was high, morale was excellent, and mission failures were never caused by shortcomings in the tracking system.

In 1970, the Hechler subcommittee recommended a reduction of \$4.2 million from the \$298 million asked by NASA, on the grounds that some of the requested new equipment could be deferred for another year. In battling the issue out with the Senate in the conference committee, it was finally decided to make the cut a compromise \$2.8 million.

In 1971, with the NASA budget request at its lowest point since 1962, only \$264 million was programed for the tracking network. The Hechler subcommittee recommended the full amount, after ascertaining that the NASA request "was carefully examined and found to be austere based." The members of the Subcommittee on Advanced Research and Technology in 1971 were the following:

Democrats

Ken Hechler, West Virginia, *Chairman*
John W. Davis, Georgia
William R. Cotter, Connecticut
Charles B. Rangel, New York
Mike McCormack, Washington

Republicans

Thomas M. Pelly, Washington
John W. Wydler, New York
Barry M. Goldwater, Jr., California
Marvin L. Esch, Michigan

In the Hechler subcommittee hearings in 1972, Congressman Rangel drew the admission from NASA that the tracking stations in the vicinity of Johannesburg, South Africa, employed blacks at a top salary of \$1,428, whereas the lowest salary paid to a white South African at the station was \$1,680, and housing and other facilities were segregated. To a question by Chairman Hechler, as to whether there had "ever been an attempt to try and (increase) the number of blacks employed, or the salaries, or the facilities," the NASA witness responded that discussions were going on.

During the consideration of the NASA authorization bill on April 20, 1972, Congressman Rangel offered an amendment to delete funds for any tracking station located in South Africa because of the effect of its apartheid policies on practices at the NASA tracking stations around Johannesburg. Rangel argued:

The question before us today is a moral one: Will the Congress permit our tax dollars to continue to be used to pay for racism, or will we continue to allow the world to believe that we still think about people as well as progress in our scientific programs?

Subcommittee Chairman Hechler advised Chairman Miller that he would not speak against the Rangel amendment, and in fact planned to vote for it. Representative Alphonzo Bell (Republican of California) undertook to oppose the Rangel amendment, with this argument:

This is not a situation we can influence, something we can directly control. No one can say there is any racism in my soul. I have voted for every civil rights measure brought to the floor of the House. I simply think it is ridiculous for us to attempt to interfere in the internal affairs of the South African Government.

Pelly told the House that "the author of this amendment in the subcommittee, on which I have the honor to be a member, did some very effective work, and directed some very penetrating questions on this whole subject." Pelly added:

I would hope, though, that if we are going to eliminate Johannesburg as a tracking station that we would also eliminate Chile, which has a Communist government, and Ecuador, which seizes our fishing boats, and I wish the gentleman would bulk them in all together.

Rangel responded succinctly:

I think that this Congress is sophisticated enough to take on one moral problem at a time, and I think I would be susceptible to any suggestion concerning any nation that is violating the rights of men.

Teague and Miller both spoke against the Rangel amendment, Miller stating:

These stations are located geographically irrespective of the government in the area where they are located.

Representative Ronald V. Dellums (Democrat of California) put it this way:

The only justification I have heard in the past 20 minutes for maintaining this station in Johannesburg is to protect safety of astronauts. I certainly do not want anything to happen to astronauts, but I raise this rhetorical question: Why are we so committed to a program that would allow the astronauts to walk in the tranquility of the Moon when we have not found the ability to come together on the floor of this Congress to adopt policies that would enhance our ability to walk as brothers and sisters on the face of this Earth?

Miller concluded:

I cannot see how you are going to do the things you have got to do and decide that you cannot do it because geographically the part of the country in which you want to place a tracking station happens to be under a government we do not like.

The Rangel amendment was defeated in 1972 in a nonrecorded vote, but Rangel brought the issue up again in 1973. By 1973, the composition of the subcommittee had changed, and the following were members of the Subcommittee on Aeronautics and Space Technology:

Democrats

Ken Hechler, West Virginia, *Chairman*
 John W. Davis, Georgia
 William R. Cotter, Connecticut
 J. J. Pickle, Texas
 Ray Thornton, Arkansas

Republicans

John W. Wydler, New York
 Barry M. Goldwater, Jr., California
 John B. Conlan, Arizona
 Stanford E. Parris, Virginia

Even though he had left the Science Committee, Rangel's efforts to eliminate NASA funding of the Johannesburg-area tracking facilities stirred a great deal more support in 1973. Rangel argued that no black NASA official had ever visited the South African tracking facility, that an alternative to the station should be found, and that continued financing of the station violated our national policy on civil rights. Chairman Teague took on the defense of funding the South African facility, and in opposition to the Rangel motion:

That station in South Africa is one of the most important tracking stations we have. * * * I do not feel this is an item that should be a factor in our authorization bill.

To Rangel's contention that blacks were not being trained for the higher paying positions exclusively held by whites at the NASA facility in South Africa, Teague offered:

I will go with the gentleman to the State Department or any place he wants to go and try to see if we can confer with that country and see if they will not train some of the black people in technical areas where they can get some of the better salaried positions.

At this point, Hechler broke with his chairman and decided to speak out on the floor for the Rangel amendment, declaring:

Because of the efforts of the gentleman from New York (Mr. Rangel) a number of improvements in housing, educational facilities, and medical care have been made at the Johannesburg installation. But the relative salaries of black and white personnel are shockingly unequal and inequitable.

On a rollcall vote on May 23, 1973, Rangel's amendment was defeated by 294 to 104. Members of the Science Committee who went against their chairman and voted for the Rangel amendment were Bergland, Hechler, and Mosher; the other members of the Science

Committee remained loyal to their chairman. Of the ten members of the Hechler subcommittee who were responsible for overseeing tracking and data acquisition, all except Hechler voted with Chairman Teague.

Hechler also clashed with Teague on a recommended cut in the tracking network. Wydler, the ranking Republican on the Hechler subcommittee, successfully amended the authorization bill in subcommittee, cutting the tracking authorization from \$250 million down to \$240 million. This action so upset top-side officials at NASA that Deputy Administrator George Low paid a secret visit to Chairman Teague, bearing a strongly worded argument in a letter from Administrator Fletcher which contended that U.S. dollar devaluations had already robbed the tracking program of \$8 million. Dr. Fletcher added that a further cut of \$10 million would endanger both the applications program and manned space flights. It was a bold move which NASA made to catch the subcommittee completely by surprise. The secret was tightly guarded. Chairman Teague completely disarmed Hechler at the opening of the full committee's markup session by saying:

The Chair would like to state to the subcommittees that he's had nothing but compliments on their work on this bill.

After Hechler had completed his usual plug for increasing the aeronautics authorization, Teague dropped his bombshell. He read a few sentences from the NASA Administrator's letter, blasting the \$10 million reduction as endangering manned space flights and the applications program. Flabbergasted, the gentleman from West Virginia just opened his dry mouth and no sound came forth; about all he could think of was to ask that the full text of the letter, which the subcommittee had not seen, be placed on the record. He counterattacked:

I must express some surprise that a communication like this should not reach any members of the subcommittee. I think it is a rather unusual procedure.

Wydler defended his amendment to cut \$10 million on the grounds that \$10 million had been reprogramed out of the tracking appropriation the prior year, that the testimony indicated a 4-percent cut would not hurt that much, and that this helped offset increases in aeronautics recommended by the subcommittee. Then the tide began to turn against the subcommittee.

"I always thought that tracking and data acquisition was extremely important," Downing led off. He pointed out that his subcommittee was concerned that their science and applications satellites were sending out more data than the tracking and data network could accommodate. "You are cutting a very essential program," charged Downing.

"This particular cut distresses me," echoed Milford. He labeled the cut as "bad economy."

Winn was even sharper in his criticism. He challenged the way the Hechler subcommittee had cut the tracking authorization to counter-balance increases in aeronautics:

I just hope that this wouldn't be the way our committee would try to dipsy-doodle funds back and forth to make room for their increases. But I am more concerned, and I want to stress again, I think we ought to pay more attention—and some of the members of the full committee were not here when the Chairman read the letter from Dr. Fletcher that involved this—and I, for one, just cannot support a \$10 million decrease in Tracking and Data Acquisition.

This colloquy then ensued:

Mr. HECHLER. I think it's very, very unfortunate that the subcommittee, which is charged with the responsibility of making recommendations, had absolutely no knowledge of this communication from Dr. Fletcher until the very minute the chairman of the full committee read it, and I don't stand on ceremony or protocol. It just seems to me that if our subcommittee is going to make a judgment or recommendation that we ought to have the benefit of at least some small caucus to discuss the details in this issue.

Mr. WINN. I would be glad to move to the Chairman that we adjourn so that you can have a small caucus if that would help you.

Mr. TEAGUE [the chairman]. The Chairman would state that he has no idea when I received this communication. Yesterday morning they contacted me. They didn't get in touch with me until afternoon, and I understand that Mr. Mosher got a copy of the same communication. * * * This item can't be put off, and I would like you to have a chance, and you should have had a chance.

Hechler was convinced, after backpedaling in the face of the criticism from both Democrats and Republicans, that a vote at the time would certainly have reversed the subcommittee's action. Spotting an opening in the last comment of Chairman Teague, Hechler observed:

I think the inference of the gentleman is entirely correct, that perhaps we should have an opportunity in our subcommittee to review this letter that Dr. Fletcher sent up to the full committee, because I think that's the only orderly manner on which we can proceed.

By unanimous consent, the vote on the tracking cut was deferred until the next meeting of the full committee on May 1, 1973. When the Hechler subcommittee convened, its chairman did not have to say a word; there was a voluble unanimity among both Democratic and Republican members who strongly urged that the new information from Dr. Fletcher did not justify changing the recommendation.

By the time the full committee met on May 1, the entire atmosphere had radically altered. In Chairman Teague's absence, Hechler was asked to chair the full committee, and he reported the unanimous action taken by his subcommittee. Some active advance lobbying by

its members produced an amazingly different reaction: Without any comment whatsoever, the motion to cut \$10 million from the tracking authorization was unanimously adopted by the full committee.

The Subcommittee on Aeronautics and Space Technology had been reviewing NASA tracking and data activities for a dozen years, and most members had personally visited tracking stations to enable them to become fully briefed on most aspects of the program. But the twin shocks of the Johannesburg floor fight and the brouhaha during the authorization hearings in 1973 convinced the subcommittee that more drastic action was necessary. In a letter to NASA Administrator Fletcher on June 18, Hechler outlined plans for an intensive oversight hearing on the tracking network. He reminded Dr. Fletcher that he expected monthly progress reports from NASA in improvements in the Johannesburg area stations, adding:

It is our intention to examine closely the status and progress of the Johannesburg Tracking Station. I urge you to do everything you can in working with the South Africans to accelerate improvements related to working conditions and opportunities for Black South Africans at the station. Action in the past has been very slow.

Dr. Fletcher responded affirmatively on June 29, promising to deliver the first report on Johannesburg "in early July."

That report, when hand delivered on July 10, proved to be a real shocker. After persuading the committee leadership how vital the South African tracking facilities were to the entire space program, NASA announced they had decided to close down their operations in South Africa. It did little good to protest after the fact that NASA should have maintained better lines of communication concerning its plans for the South African facilities. Hechler told his colleagues: "If they can communicate with deep space, they ought to be able to communicate better with us." Obviously, the strong opposition expressed during the 1973 authorization debate influenced NASA's decision. The action had no visible adverse effect on the reliability of the tracking network. The tracking station in Spain took up the slack.

Proceeding with the general oversight investigation, Hechler obtained permission from Chairman Teague to borrow personnel from the General Accounting Office and Department of Defense. To help cement better understanding in the other subcommittees, a July 31 memorandum to Teague indicated:

I would welcome the participation of Don Fuqua and Jim Symington in the conduct of the Tracking and Data Acquisition review because of the close relationship of this program to their areas of interest.

During extensive hearings and field trips throughout the summer of 1973, including well attended public hearings in October 1973 and January 1974, the Hechler subcommittee examined each tracking station, its role, its manpower, and activities of supporting contractors,

as well as relationships with host nations. The committee also examined the proposed new Tracking and Data Relay Satellite System, a leased system which enabled better transmission and reception of data through what were essentially two network satellite stations in synchronous orbit.

In general, the thorough oversight investigation gave the NASA tracking network high marks for efficiency and economy of operation. It also strengthened the subcommittee's ability to field any and all questions which had been popping out of the blue concerning the program. But in 1974, NASA revealed the details of the new financing proposal for the planned new satellite relay tracking network. NASA asked that the basic 1958 Space Act be amended to give them authority to enter long-term leasing arrangements. NASA attempted to prove that leasing would be cheaper, but the subcommittee produced its own figures to show that it was far cheaper to buy the services outright. New hearings, investigations, and conferences wrestled with this issue during the early months of 1974. Finally, the subcommittee came up with a compromise which amended the authorization bill in 1974, and required NASA to come back for committee approval after the RFP's (requests for proposals) had been circulated to the bidding contractors. This brief summary covers many weeks of sweating out an extremely complex series of decisions, clearly demonstrating the impact of the committee on public policy—albeit not as spectacularly dramatic as being present at the creation of the Apollo program.

When the subcommittee presented its proposal in 1974, there was a universal rush by both Republicans and Democrats to praise the care and attention given in protecting the interest of the taxpayers. At Hechler's request, NASA also produced a written promise to speed up its cost-benefit analyses in such a way as to give the authorizing committee in the spring of 1975 a clearer roadmap for the future. The subcommittee was still slightly troubled that the central NASA argument for leasing instead of purchasing was that it would stretch out the total expenditures over many years instead of lumping them in one year. But the subcommittee agreed that the compromise procedure would give Congress one more crack at it in 1975.

Contrary to the buffeting which the subcommittee took in 1973 when they tried to save \$10 million, in 1974 the complex compromise went through unanimously. The extensive hearings and staff work on the tracking and data acquisition program certainly confirmed the fact that knowledge is power.

In 1975, jurisdiction over the tracking and data acquisition program passed to the Fuqua Subcommittee on Space Science and Applications. In presenting the tracking authorization to the House on April 9, 1975, Fuqua reported the successful data obtained from

Pioneer and Mariner spacecraft photographing and obtaining other valuable data from Saturn, Jupiter, Venus, and Mercury. The full committee and the House supported the subcommittee's recommendation to cut the tracking authorization in 1975 by \$2.2 million. Unlike earlier protests against reductions in this area, the committee ratified the cuts without a murmur. Wydler successfully put across his amendment to insure that NASA would have the option to purchase the expensive new Relay satellite system at the conclusion of the leasing period. Once again in 1976, the Fuqua subcommittee engineered a reduction—this time of \$4 million—in the NASA tracking request, and succeeded in having \$3 million of that reduction stick by the time the bill emerged from the conference committee. Despite inflation which affected costs at the Madrid tracking station, the committee felt that the \$255 million actually authorized would fully support the 40 individual programs being tracked. In 1977 and 1978, the authorization for the tracking network crept up to exceed \$300 million annually, primarily due to inflation. In addition, larger requirements were imposed on the tracking network as interplanetary flights like Voyager proceeded to Jupiter, Saturn, and the sizable moons near those planets. Late in the 1970's, NASA also began building a new ground terminal at White Sands, N. Mex. to supplement the two geosynchronous satellites to be used in the new Tracking and Data Relay Satellite System scheduled for operational use in 1980.

The committee kept a watchful oversight eye on the rapidly changing nature of the tracking network, with special emphasis on how the new tracking facilities would cope with the specialized demands of the Space Shuttle missions. The Fuqua subcommittee followed very closely the terms of the lease contract with Western Union Space Communications, Inc., a subsidiary of Western Union Telegraph Co., to insure that the public and taxpayer interest was fully protected. From 1977 through 1979, Dan Cassidy of the committee staff completed several detailed reports on program cost, performance, and schedule, which further enabled the committee to ride herd on the extremely complex procedures in the tracking program.

As the 1970's drew to a close, the Science Committee through the Fuqua subcommittee was buttressed with more than enough specialized data to enable sound decisions to be made on funding, general oversight, and keeping tabs on program developments. The committee had clearly come of age since the days when hundreds of millions of dollars were authorized pretty much "on faith." A mutual respect had developed between the committee and NASA, as the complex tracking operation moved into the transition period toward the installation of a new system of high-speed transmission and fuller coverage through the Tracking and Data Relay Satellite System of the 1980's.

TECHNOLOGY UTILIZATION

As noted in chapter VII, the technology utilization program was the subject of annual efforts by the committee to try and persuade NASA that more emphasis should be placed in this area. Under the leadership of the Hechler subcommittee from 1970 through 1974, and the Fuqua subcommittee from 1975 until the end of the decade, the scenario each year went like this: (1) NASA would present a pitifully small budget request, starting at \$4 million and eventually rising to \$9 million; (2) the committee would devote considerable time listening to the very fascinating review of the varied spinoffs in practical benefits produced by American industry; (3) the committee would invariably vote annual increases, urging NASA to give a higher priority to the program; (4) the House of Representatives would customarily vote larger authorizations than the Senate, and the House conferees from the committee would frequently win out to include the higher figure in the final bill; (5) the Appropriations Committees would usually cut back the program; and (6) NASA would rarely ask for larger increases in the technology utilization program, despite the almost certain knowledge that such increases would have been approved.

In 1970, Hechler engaged NASA witnesses in one of a continuing series of pointed colloquies which seemed to produce non-answers:

Mr. HECHLER. This committee has very strongly supported technology utilization from the beginning * * * and we are very disturbed by the reduction in the amount of NASA support.

Mr. DAY [in charge of technology utilization]. Yes, sir.

Mr. HECHLER. You wouldn't care to react or comment on that observation?

Mr. DAY. Well, our management does feel strongly about the technology utilization program, and supports it strongly at all levels.

Mr. HECHLER. What percentage of the NASA budget are you spending on technology utilization?

Mr. DAY. I believe about one-tenth of 1 percent.

Mr. HECHLER. That seems to me to be the kind of commentary I wanted to make on the amount of importance that you ascribe to something the country feels is very necessary. Dr. Low, would you like to address yourself to that question?

Dr. Low [NASA Deputy Administrator]. Mr. Hechler, as we have discussed before here, we would like to really increase every area in NASA's budget. In making the hard decisions this year as to where to take our cuts, this was one area we felt we should support at the \$4 million level.

Mr. HECHLER. Therefore you only cut it 20 percent.

Dr. Low. We did, yes, sir; we cut it from \$5 million to \$4 million.

Mr. HECHLER. The argument that I am trying to make here is not that you haven't received an overall cut, but that at a time when the attention and interest of both the Nation and the Congress is focused on results and application to people here on Earth, why can't you put a little bit more emphasis on what the people of this country are interested in, rather than what you are interested in?

Dr. Low. Well, sir, I am also very much interested in this program, and I think all of us are. We felt that at the \$4 million level in this budget year we could place into technology utilization those most important things in this area that should be in this area.

In 1970, the committee succeeded in increasing the authorization by \$500,000, an increase which survived all the hurdles in the legislative process. The committee report in 1970 stated:

To carry on the modest, but important work in disseminating the results of the space program to the taxpayer, a small increase of \$500,000 is recommended. Specifically, it would be used for an additional Applications Technology Team to work specifically on the problems of transferring NASA technology for the solution of urban development and environmental quality problems.

The technology utilization program seemed well designed to produce the kinds of results desired by the Congress. Four times a year, NASA published "Tech Briefs," based on inventions or innovations developed by contractors in the course of work for NASA. Also, a summary of all inventions patented by NASA was published. In addition, NASA published "Computer Program Abstracts" which noted government-developed computer programs which could be adapted for use by industry. All sorts of new information was made available on decontamination, new lubricants, new developments in welding and soldering, and many other industrial improvements. Scientists, engineers, and computer retrieval specialists helped staff NASA industrial applications centers to help industrial clients. Another adjunct to the program was the State technology applications center to help transfer some of this vast technology to State and local governments and private industry.

Once again, in 1971, NASA came back with a recommended reduction down to \$4 million in this area. This time, the committee decided to increase the technology utilization program to \$6 million—an increase of \$2 million over NASA's budget. The conference committee went along with a more modest increase to \$5 million. Among the new NASA-inspired inventions and innovations listed during the 1971 authorization debate by Representative R. Lawrence Coughlin (Republican of Pennsylvania) were these:

Chances are, gentlemen, that the packaged steak your wife bought at the market this week is wrapped in the same type of transparent polyester film—one two-thousandth of an inch thick—used for America's giant balloon satellites.

Doctors can watch a movie of the beating of a patient's diseased heart—identifying dead spots or scar tissue in the heart wall, and other malfunctions—with a computer method devised by a NASA team at Stanford University.

The search for new oil and gas deposits is being effectively aided by technology directly resulting from the space program.

It was the same story in subsequent years. Irrked at the rapid turn-over among Directors of the Office of Technology Utilization, Hechler had the following exchange at the 1973 hearings:

Mr. HECHLER. How many Directors of Technology Utilization have there been? What number are you?

Mr. FARLEY. Mr. Moritz, for whom I am now appearing, would be number six.

Mr. HECHLER. This is obviously a highly hazardous job. More hazardous than being a Congressman.

In an effort to highlight the emphasis which his subcommittee placed on technology utilization, Hechler scheduled the director of that office as his leadoff witness on March 5, 1974. It was the last chance the Subcommittee on Aeronautics and Space Technology had before relinquishing the jurisdiction to the Fuqua Subcommittee on Space Science and Applications in 1975. The curtain went up with the following dialogue:

Mr. HECHLER. The first order of business is to examine technology utilization, which is an area of emphasis that both this subcommittee and the full Committee on Science and Astronautics stress as being a vital part of the space program.

We have continuously placed greater emphasis than NASA in the areas of technology transfer and technology utilization. Unfortunately, all that it has taken has been the flick of an OMB pencil to scratch out congressionally authorized and modest increases for technology utilization.

I regret to say that the top management at NASA has not fought very vigorously against this type of action. In fact, NASA seems to have taken the position there are more important programs to argue about. * * *

And then, lo and behold, there appeared another new Director, Edward Z. Gray. Mr. Gray modestly proclaimed that he did not intend to become an "endangered species, because I must be Number Seven. I hope that's a lucky number."

One of the most interesting examples of technology utilization was presented to the committee in 1974 by William Z. Penland, Jr., of the National Cancer Institute. Because of the high danger of infection, many leukemia and other patients were isolated in germ-free "clean rooms," which was very confining for younger patients in need of more physical exercise, trips to have X-rays taken, et cetera. So NASA helped adapt the biological isolation garment used by the Apollo crew for use to enable "clean room" patients to enjoy what is called a "mobile sterile environment."

A third application developed as a result of NASA experience was demonstrated to the subcommittee by Dr. Karl H. Frank of the Federal Highway Administration. Dr. Frank explained how a NASA computerized technique for measuring and analyzing vibration was applied to test the structural integrity of bridges, and determine their need for repair and possible threats to safety.

Still another device to aid firefighters was described to the subcommittee as "a portable breathing apparatus which will combine a lighter, longer duration air supply with a better sling harness and a face mask design based on NASA experience in human factors engineering."

Conscious of and sensitive toward the increasing pressure of the committee to beef up applications and technology utilization, NASA Administrator Fletcher decided in 1975 to lead off his testimony with a series of demonstrations of spinoffs from NASA's work. The presentation was far broader than technology utilization. The first witness, Dr. Helen Christy Cannon, Medical Officer of the Alaska Area Native Health Service of HEW, gave a very dramatic series of illustrations with the use of videotape to show how an applications technology satellite had brought diagnosis and medical advice quickly into remote or isolated areas in Alaska. Other presentations illustrated how NASA technology was assisting agriculture, education, medicine, and many other fields.

For the first time in 1975, Chairman Fuqua's Subcommittee on Space Science and Applications assumed the leadership for technology utilization. Two pleasant surprises greeted Fuqua on February 25, 1975. First, Edward Z. Gray showed up sporting rather lengthy seniority so far as technology utilization directors go—it was his second consecutive year in that position. Second, NASA had budgeted \$7 million for technology utilization—an increase of \$1.5 million over their prior year expenditure. Gray brought to the subcommittee's attention a new cataract removal device, the use of safety criteria for storage of liquid natural gas, and the use of flat conductor cables in housing—to mention only a few. Chairman Fuqua then posed that key question which is music to the ears of every witness:

If you had some more money, say another million dollars, what would you do with it?

Gray took the bait quickly, mentioned the biomedical applications centers, plus the backlog of applications pending for additional assistance. He supplied some hard and persuasive data which prompted Fuqua to observe at the close of the hearings:

I think that this is one area that we need to be doing more in.

True to his word, Fuqua helped engineer a \$2 million increase for technology utilization through his subcommittee. The Senate rather woodenly declined to take any interest in the area beyond the NASA budget of \$7 million. As a matter of fact, the Senate Committee on Aeronautical and Space Sciences engaged in some mighty tortured reasoning in an attempt to justify why they wouldn't go along with the House plea for greater emphasis:

The Committee believes, however, that such a large expansion in one year must be carefully initiated and controlled to assure success and avoid the pitfalls of too rapid growth. Accordingly, the Committee does not agree with the House action which added another \$2 million to the already planned program expansion, resulting in a proposed 63 percent increase in one year.

This smothered the chance to make a dramatic leap forward in technology utilization as the United States of America approached its bicentennial year. The conference committee compromised on \$8 million.

In 1976, NASA pleased the subcommittee by presenting its Technology Utilization budget request first on the list, and some kind of record was set when Edward Z. Gray appeared for the third year in a row. What's more, Mr. Gray came up with a suggested increase from the \$7 million NASA had proposed the prior year up to \$7.9 million. After due deliberation, the Fuqua subcommittee added \$500,000.

Winn, ranking Republican on the Subcommittee on Space Science and Applications, told his House colleagues on March 22, 1976:

The program plays a major role in terms of dissemination of technological information and transfer of advanced technology from the aerospace sector. We on the committee are well aware of the danger of "overselling" aerospace fallout and the tendency of some to view technology utilization as simply more public relations. However, we feel that the modest increase of funding here, \$500,000 will be returned man, fold in transferring NASA-developed technology to applications in the private sector and within other Government agencies.

Grudgingly, the Senate committee finally recognized the need for more activity in this area, and took the somewhat radical step of recommending that \$200,000 be added to the NASA request. The usual custom of splitting the difference did not occur in the conference committee, which finally decided to stick to the modest increase voted by the Senate.

In 1977, Edward Z. Gray, who seemed by now to be a fixture, appeared for the fourth straight year on behalf of the technology utilization program. The first budget of the Carter administration included \$8.1 million for the program, which the House on recommendation of the subcommittee and full committee promptly hiked to \$9.1 million. Fuqua told his House colleagues that one of the reasons for the increase was that the committee wanted NASA to "conduct a cost-benefit analysis of the program and report the results of that effort to the committee not later than December 31, 1977." Finally, the Senate went along with the increase, thus making the annual conference committee argument unnecessary. But after laboriously marching up the hill for a modest increase, the Science Committee was pushed back when the House and Senate appropriations committees heartlessly decided to cancel out the entire increase. Nevertheless, NASA dutifully proceeded with the cost-benefit analysis.

In 1978, there was a new Director of Technology Utilization, Lou Mogavero, who confessed:

The process for infusing technology into the mainstream of the economy is still not well understood nor is it easily brought about. * * *

NASA demonstrated before the Fuqua subcommittee in 1978 a light-weight firefighting module, transportable by helicopter, for use by the Coast Guard. The pump is also being marketed for municipal and industrial use, and is capable of pumping greater quantities of water farther and faster than any other system available. It was developed from NASA technology used on high-speed rocket engine pumps at the Marshall Space Flight Center.

On February 7, 1978, Mr. Mogavero presented the results of the NASA cost-benefit study which the committee had requested in the authorization bill in 1977:

NASA is gratified to report that the study shows that every dollar expended by our technology utilization program to actively and aggressively bring aerospace technology to bear on public and private sector problems results in at least a \$6 benefit to the economy.

The subcommittee Members were delighted with the presentation. Representative Wes Watkins (Democrat of Oklahoma) noted:

When you see a return of 6-to-1 on your investment that's pretty good.



Representative Albert Gore, Jr. (Democrat of Tennessee), who joined the committee in 1977.



Representative Bill Royer (Republican of California) is the newest committee member in 1979.

Representative Albert Gore, Jr. (Democrat of Tennessee) added:

The political support within America for the space program depends in no small degree on the success of the technology utilization concept.

When it came time for the subcommittee to mark up the NASA bill, the enthusiasm of the Members sustained an increase from the \$9.1 million asked by NASA to \$14.4 million. It was the largest single increase ever suggested for Technology Utilization since the office had first been established in 1963. The full committee and the House both sustained the 60-percent increase, which went far beyond the \$10.6 million which NASA had requested of the Office of Management and Budget. The committee pinpointed that the increase was for the following purposes:

\$1.5 million is provided to increase the scope and effectiveness of Industrial Application Centers and other technology dissemination mechanisms, and to continue evaluation of program benefits and future opportunities. An additional \$4 million is added to assure that aggressive programs are maintained for transferring NASA technology to bioengineering applications in the areas of materials, human factors engineering and electronics.

Once again, the Senate objected to the increases, pointing out that funds were included to assist handicapped and disabled persons:

While the committee supports fully the technology utilization program, it does not understand the rationale for expanding NASA's basic charter into a specific area of medicine or for the substantial increase in resources applied to this activity.

Although the conference committee compromised at \$12.1 million—a \$3 million increase over the NASA budget, the appropriations committees agreed to cut the whole item back to \$9.1 million.

NASA reorganized Technology Utilization into its Office of Space and Terrestrial Applications, somewhat to the dismay of the committee in 1978. During the program review of NASA by the committee in September 1978, Fuqua raised a number of questions which expressed the concern of the committee lest technology utilization be downgraded in the NASA organizational structure. Fuqua was assured that it would remain a separate line item in the NASA budget, and not be downgraded by the transfer. As Fuqua put it:

We are very much concerned that it not be overshadowed by other mainline programs.

Dr. Anthony J. Calio, NASA's Associate Administrator for Space and Terrestrial Applications, repeatedly protested that NASA would continue to stress technology utilization. The protestations sounded very much like they had in the past, prompting this exchange:

Mr. FUQUA. I am trying to give you some hints.

Mr. CALIO. OK. I got the message.

During the years from 1963 through 1979, the committee repeatedly

attempted to inspire NASA to take a greater interest in technology utilization. The committee was far ahead of NASA in its faith in the program. It is unfortunate that the Senate, as well as the top administrators of NASA, did not completely share this high degree of enthusiasm.

PUBLIC AFFAIRS PROGRAM

"Your statement is most interesting," Teague told the Director of the technology utilization program during a 1970 committee hearing. The witness beamed and responded: "Thank you, very much." Teague brought him down from the summit immediately by observing: "But we haven't gotten across to the public very well."

Throughout the 1960's during which Teague chaired the Subcommittee on Manned Space Flight, he carried on a running battle with NASA over what he regarded as poor leadership of its public affairs program. One of Teague's targets was Julian Scheer, who had been brought in by Administrator Webb to direct NASA's Office of Public Affairs. Teague and other committee members felt strongly that insufficient emphasis was being placed by NASA on publicizing the spinoff benefits of the space program. It galled the committee that NASA would not take the initiative to produce a publication such as the committee itself compiled, entitled "For the Benefit of All Mankind"—which broke all committee records for popularity. Teague also had a personal feud with Scheer, growing out of sharp differences over invitations to space launches at the Cape. Teague had a host of friends strongly supporting the space program, and he knew when the program would gain even stronger support by the presence of certain individuals at the launches.

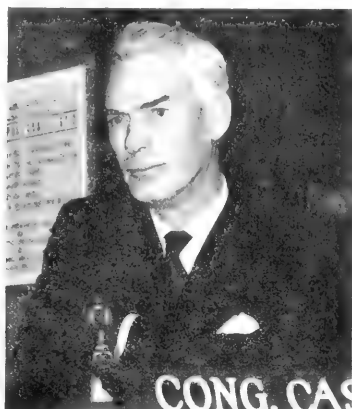
In 1969, Teague led a unanimous effort in the committee to slash the authorization for the headquarters Office of Public Affairs by \$1.5 million, on the grounds that "the management and supervision of these activities at the headquarters level leaves much to be desired." The committee report stipulated that "none of this reduction shall be levied against public affairs accounts at the field center level." Even though the move was aimed directly at Scheer, the slash was not sustained by the Senate or conference committee. Scheer resigned his post in February 1971.

In August 1971, John P. Donnelly was appointed Assistant Administrator for Public Affairs. A former vice president for corporate communications of Whittaker Corp., one of Donnelly's first moves was to pay a courtesy call on Chairman Miller to whom he subsequently wrote a note:

As promised, I will keep you fully informed about NASA's Public Affairs activities. I welcome your interest and advice, and with your permission, will actively solicit your ideas and suggestions on how we can better explain to the public the importance of the space effort to the well being of this Nation and all its Citizens.



Representative and Mrs. Robert Price (Republican of Texas) at Johnson Space Center. Representative Price served on the committee from 1969 to 1973.



Representative Bob Casey (Democrat of Texas), a committee member from 1961 to 1965, after which he joined the Appropriations Committee. Congressman Casey maintained an active interest in the committee's progress, as he represented one of the Houston, Tex., congressional districts.

In mid-1972, Representative Bob Casey (Democrat of Texas), expressed concern about the weak NASA public affairs program to Fuqua, who at that time was serving as Chairman of the Subcommittee on NASA Oversight:

I wanted to call this to your attention and possibly in your hearings you would see fit to see what remains of our efforts to keep the public, and in particular the educational institutions, properly informed as to NASA's worth.

Fuqua responded to Casey that the committee had expressed its concern to NASA several times "for the lack of direction, control and emphasis in this area." He added that decreased funding for NASA had naturally been reflected by decreased funding in the public affairs area, and that a Presidential order of November 6, 1970, had directed a sharp reduction in funds to be available "for broadcasting, exhibits, films, publications, and similar public relations efforts." A strong economy bloc in Congress, led by Senator Proxmire of Wisconsin, was also attacking public relations funding.

In an interview, Casey recalled his many efforts to persuade NASA to increase its efforts to educate the public about space, and also redirect its activities toward problems on Earth. As Casey put it:

I told them at NASA: "You had better be prepared to get into the other problems we are faced with—such as waste treatment." They said: "We are not garbage men or sewer men." Some of those ones who gave me that back talk are not there any more. And they did not leave voluntarily.

"NASA and the aerospace industry need to bring the message of the contributions of our national space program more forcefully to the public," declared Teague in a 1972 interview in the North American Rockwell publication "Skyline." Teague also sparked a move to expand the Visitors Information Center at the Kennedy Space Center, which was achieved through a committee-sponsored amendment to the NASA authorization bill. General Electric Co. produced a special color-illustrated publication of "For the Benefit of All Mankind" to spread the word about space spinoffs. Fuqua, Frey, Winn, Cronin, and Ketchum were among the leaders supporting Teague's efforts on the committee demanding more aggressive NASA efforts in the public affairs area. They remained dissatisfied with the results.

When Teague became chairman of the full committee in 1973, one of his first moves was to ask staff director Swigert to generate a full-scale inquiry into NASA's public affairs activities. Swigert assigned principal responsibility for the task to Thomas N. Tate, a committee staff member who had served in the operations and marketing area of North American Rockwell Corp. In assigning Tate to the task, Swigert noted:

The Chairman has the feeling that the American public is not adequately informed about the Space Program—its capabilities and relevancy to the current problems—it is a feeling I also share. Because of your prior experience, I would like to assign you this task. The first step, it seems logical, is to examine NASA's Public Information Program. * * * After the NASA evaluation, incorporate your recommendations into a broad program encompassing all the available public information facilities of contractors, industry associations and NASA for presentation to the Chairman.

In a yearlong study in conjunction with some trips to NASA field installations, aerospace contractors, and others, the committee staff presented its conclusions on July 3, 1974. Tate, in transmitting the report, outlined six options open to Chairman Teague, all the way from holding a public hearing to private consultations with NASA on the conclusions and recommendations. Operating with his customary directness, Teague instead handed the staff study to Dr. George M. Low and Rocco Petrone, two NASA officials who happened to be riding on a plane with him. Teague said to them: "Here, answer this."

On September 13, 1974, NASA Administrator Fletcher furnished a point-by-point commentary on the report to Teague. In general, he expressed agreement with the committee analysis and prescriptions.



Dr. James C. Fletcher (right), fourth NASA Administrator, presents Robert H. Goddard Trophy to Science Committee Chairman Teague on March 8, 1974.

The report stressed that NASA was placing too much emphasis on the technical details concerning the status of their hardware instead of emphasizing the results and value to average people. Dr. Fletcher commented: "We have come a long way in getting our people to put less emphasis on hardware, but we have still got a long way to go."

The committee stated the "NASA public affairs activity policy appears to have overreacted to the negative public image created by 'The Selling of the Pentagon' (a popular television network exposé of military public relations) and is very sensitive to being accused of the same." Dr. Fletcher commented that high credibility was his aim.

The committee faulted NASA for failing to take advantage of aerospace and other industrial resources, to which Dr. Fletcher responded: "Our experience is that when pressed, corporations still want to go it alone."

The committee suggested that NASA ought to take more advantage of the technology utilization program. Dr. Fletcher answered he

did not completely agree, and contended that technology utilization served a different audience.

The committee urged greater emphasis on the "Spacemobile" which had successfully brought the advantages of the space program into classrooms from coast to coast. Dr. Fletcher furnished figures which contended that a growing proportion of funds were being spent on the Spacemobile.

A typical example of the difference of opinion between the committee and NASA is contained in this exchange:

Committee Staff Report.—The NASA Public Affairs program appears to lack innovation, initiative and imagination and can be traced to the policies of the Agency which are the responsibility of the Administrator, Deputy Administrator, and the Assistant Administrator for Public Affairs or a combination of all three.

Fletcher's response.—Do not agree in the context of our understanding of the terms "innovation, initiative and imagination"; however, NASA does agree that more could and should be done.

In its 1974 report on the NASA authorization bill, the committee concluded the following, among other views:

It is the sense of the Committee that NASA should be doing much more in the area of disseminating *space benefits* information to the public at large through its Public Affairs Organization.

Although there were some spotty improvements in NASA efforts, the committee throughout the period remained critical of NASA's total accomplishments in getting the space benefits story to the people. In a letter to Teague on May 24, 1978, Dr. Fletcher commented:

The Committee really gave NASA a difficult time trying to encourage it to broaden and intensify its program of communicating with American taxpayers. Engineers typically do this rather poorly, and yet Congressmen, because of the nature of the political process, are skillful at this. Part of the pressure on the part of Committee members was frustration at NASA's inability to perform better in this field.

We did succeed in bringing professionals into NASA's Headquarters organization, but I'm afraid we never really did satisfy the Committee's hopes in this regard. * * * One difficulty, however, which is a perpetual one is that the Committee wanted us to spend more money in this area but we were severely constrained from doing so by OMB, and I imagine this is still the case.

The most exciting development in response to the committee's efforts has been the publication of the annual "Spinoff" reports by the Technology Utilization Division, which commenced in the bicentennial year of 1976. "Spinoff 1979," a 116-page color illustrated publication, proved to be one of NASA's most popular publications, and the demand exceeded the supply.

Some of the "mainline" or direct benefits are provided through weather and communications satellites, orbiting satellites like Landsat

which assist in the management of the Earth's resources (such as predictions of the world's wheat crop through "LACIE"—the Large Area Crop Inventory Experiment), aeronautical research to aid in producing safer and quieter airplanes, water quality monitoring through remote-sensing scanners, aerial surveys which pinpoint buildings losing heat and assist in energy conservation, the use of solar cells to convert sunlight into electrical energy, and satellite search and rescue to aid aircraft and ships in distress. Indirect or "spin-off" benefits include thousands of applications from aerospace now being utilized in construction, public safety, health and medicine, sports and recreation, transportation, food and agriculture, computers, communications and community services. Among the items described in "Spinoff 1978 and 1979" are the following: Domed fabric roofs, originally developed from fiber glass fabric used for astronauts' space suits, now widely used to reduce construction costs—one example being the 80,000-seat "Silverdome", the home of football's Detroit Lions; "intruder detectors" for home and industrial plants, which were developed from highly sensitive seismic measuring devices used on the Moon; satellite heart monitoring, for use by emergency medical service vehicles to relay information while en route to a hospital emergency room; automatic blood pressure measurement, as used by astronauts for simple and accurate readings; "image enhancement" to improve readability of old documents and photographs through the application of the process NASA used to improve pictures sent to Earth from distant space; expansion of the data bank which helps promote technology transfer through access to 10 million documents containing technical data of possible application to new developments; and adaptation of thin insulating film on satellites for use on home and office windows to reflect the Sun's heat outward in summer and retain interior heat in winter.

On July 19-20, 1979, the committee joined with the House Select Committee on Aging in joint hearings on the applications of space technology for the elderly and handicapped. In his statement launching the hearings, Chairman Fuqua stated:

Today, damaged hearts are run by pacemakers, and ailments diagnosed by a computer. Tomorrow, the dispensing of medications and the elimination of chronic pain will be accomplished by implantable devices.

The joint hearings represented another in a long series of efforts by the committee to encourage both NASA, other agencies and private industry to place a high priority on the practical applications which benefit human beings on spaceship Earth.



The committee encouraged the expansion of the program to staff U.S. embassies abroad with science attachés. At a special committee reception for science attachés, Representative Don Fuqua (Democrat of Florida), center, converses with Sidney Smith, stationed at Bucharest, and Robert Wilcox, stationed at Buenos Aires.



William Mills, science attaché at U.S. embassy in Belgrade, with Dr. J. Thomas Ratchford of committee staff and Representative James W. Symington (Democrat of Missouri), right.

CHAPTER X

International Scientific Cooperation, 1959-79

One warm and sunny day in 1965, two U.S. Congressmen, on a junket in Africa, drove a jeep up to a small grade school in a remote rural village in Ethiopia. During "gym" period, they joined the students in a vigorous game of volleyball, after which the pupils without any shyness began shooting questions about America. When they discovered that the Congressmen were members of the Science Committee, the queries came thick and fast: "Who will get to the Moon first? Will Alan Shepard go? What about 'Gordo' Cooper?"

Two things struck us about this encounter. The students were far more excited to hear about space than racial problems, armaments, or color television, and they knew the names and nicknames of American astronauts. But like the competitive excitement of the volleyball game, they were far more interested in who would win the space race than to hear us paint the glowing picture of how Earth resources and communications satellites would improve their lives and lead to better international cooperation.

During its first decade, the committee, like the mythical Janus, somewhat ambivalently looked in two directions: To beat the Soviet Union to the Moon and to lay the foundations for peaceful cooperation with all nations, including the Soviets.

PEACEFUL EXPLORATION OF OUTER SPACE—1958

So it was when the Select Committee on Astronautics and Space Exploration was first formed in 1958 as a direct answer to the launch of Sputnik, one of the early accomplishments of the select committee was the passage of a concurrent resolution for the peaceful exploration of outer space. On June 2, 1958, the House of Representatives unanimously passed House Concurrent Resolution 332, sponsored by Select Committee Chairman John W. McCormack. It was an eloquent resolution, pledging the United States, through the United Nations, to work for an international agreement banning the use of outer space for military purposes. It also affirmed that the United States should seek "an international agreement providing for joint ex-

ploration of outer space," as well as joint cooperation in the advancement of scientific developments through communications, weather forecasting, and other means. Chairman McCormack used winged words to urge passage of his resolution:

In this last fateful year we have been privileged to witness man's first faltering steps from his cradle, Earth. I hope that we shall all live to see these faltering steps become giant strides as man journeys far into the starlit cosmic spaces in the exploration of the unknown and toward the promise of new worlds and new knowledge.



Representative James G. Fulton (Republican of Pennsylvania), left, and Ambassador George J. Feldman, at the United Nations General Assembly, where they served as delegates.

Republicans and Democrats alike, including a future President of the United States (Representative Gerald R. Ford), spoke out for the resolution which was unopposed despite the fear of recent Soviet space successes. Congress also wrote into the basic Space Act of 1958 language which unmistakably dedicated the National Aeronautics and Space Administration to a civilian-controlled accent on the use of space for peaceful purposes:

The Congress hereby declares that it is the policy of the United States that activities in space should be devoted to peaceful purposes for the benefit of all mankind.

The Congress also wrote into the Space Act that one of NASA's objectives should be "cooperation by the United States with other nations and groups of nations in work done pursuant to this act and

in the peaceful applications of the results thereof." In addition, Congress stipulated the following in the basic act:

The Administration, under the foreign policy guidance of the President, may engage in a program of international cooperation in work done pursuant to this Act, and in the peaceful applications of the results thereof, pursuant to agreements made by the President with the advice and consent of the Senate.

The select committee also produced a "Survey of Space Law" which included a comprehensive study of the political and legal problems associated with the exploration of outer space. These preliminary studies laid the groundwork for the adoption by the General Assembly of the United Nations of resolutions in 1958 and 1959 setting up a Committee on the Peaceful Uses of Outer Space. Science Committee members Victor L. Anfuso (Democrat of New York) and James G. Fulton (Republican of Pennsylvania) as well as Select Committee Director George J. Feldman served as delegates to the U.N. General Assembly.

CHAIRMAN BROOKS AND INTERNATIONAL COOPERATION

Some Science Committee members were apprehensive about the attitude of the committee's first chairman, Overton Brooks, toward international cooperation. From many years on the Armed Services Committee, plus the strong support of his constituency, Brooks had a promilitary bias. Also, he was caught up in the emotionally bitter hatred of anything which emanated from the Soviet Union, plus a strong determination that the top priority was to beat the Russians and not to share anything scientific which might interfere with that goal. Committee members feared that Chairman Brooks might shy away from any international gestures. Chairman Brooks answered these fears by sanctioning a series of productive hearings by the House Committee on Science and Astronautics during March 1959—less than two months after the committee was formed. The hearings on "International Control of Outer Space," followed by an influential committee report entitled "U.S. Policy on the Control and Use of Outer Space," furnished leadership for American efforts at the United Nations and in other world forums.

SCIENCE COMMITTEE LEADERSHIP ON INTERNATIONAL POLICY

Once again the Congress seized the initiative from the executive branch when in a report dated May 11, 1959, the committee unanimously voted to call on the administration to establish a "more definite" policy toward international control and use of outer space. The committee complained that the United States has "no crystallized positive policy toward space—other than its general commitment to

reserve space for peaceful purposes and to study related problems." The committee unanimously declared that the United States should lead in establishing world policy toward outer space by formulating "a positive national policy" at the earliest possible moment.

The committee's report was also designed to coincide with the opening of United Nations deliberations, which the Soviet bloc nations at that time were boycotting. The committee stressed that despite the boycott of the Ad Hoc U.N. Committee on the Peaceful Uses of Outer Space, this should not be taken as an excuse for the western world "to sit back and do nothing." The committee report commented:

The most likely area for a beginning process of space control is the commercial and scientific uses of space.

The committee suggested that first steps might include negotiating for space agreements in such areas as notice of launches and identification of space vehicles—which were eventually included in the space treaty ratified by the Senate in 1967.

Many committee reports gather dust and are not unearthed until future historians discover them. Chairman Brooks may not have been the most popular individual among some members and staff, but you had to say one thing for him, he had a finely tuned sense of public relations. Two days before the official release date of the committee reported entitled "U.S. Policy on the Control and Use of Outer Space," the full text found its way into the hands of John W. Finney, the pipe-smoking science correspondent on Capitol Hill for The New York Times. Result: A front page article in the Times, headlined: "House Panel Urges U.S. Lead in Shaping World Space Policy."

FULTON PUSHES COOPERATION

The contrasting attitudes within the committee were well expressed at the first hearing on international cooperation. Fulton took the position that our policy should be greater dissemination of information, while Chairman Brooks felt differently, as expressed in the following exchanges:

Mr. FULTON. In the bill that we passed last year, one provision proposed by many of us on the Select Committee on Space and Astronautics, said that our aim in the United States should be to make public these scientific facts of discovery in the space field, really for the benefit of the whole world.

Chairman BROOKS. My own judgment is perhaps tempered by 22 years on the Armed Services Committee, and I don't believe in the space age there is any second place in a war between two major powers—

Mr. FULTON. But certainly, Mr. Chairman, if you would yield, this committee has jurisdiction of the entry into space by peaceful means and to use it for peaceful purposes.

Chairman BROOKS. We would prefer it all be for peaceful purposes.



Dignitaries from 16 foreign nations were present at the fifth anniversary of the international tracking of space vehicles, held at NASA's Goddard Space Flight Center, January 31, 1963. From left, front row, are Secretary of State Dean Rusk, NASA Administrator James E. Webb, Chairman Miller and (second from right), Representative James G. Fulton (Republican of Pennsylvania).

INTERNATIONAL AGREEMENTS AND THE TRACKING NETWORK

The urgent necessity to build and operate worldwide tracking networks for manned space flight, as well as for orbiting satellites and deep space probes, speeded up American negotiations with many nations on all continents throughout the entire period. Congress liberally funded these efforts, as well as dispatching committee members to inspect progress and help smooth the relationships with leaders of foreign governments on whose soil the tracking stations were being built. Committee members took pains to underscore the fact that, unlike the tracking stations designed for the Department of Defense, the central purpose of the exercise was exclusively civilian and scientific in nature. At the same time, the committee was constantly on the alert to assure that there was full coordination and no duplication with DOD tracking facilities. Evidence of this fact is revealed in the history of NASA's tracking networks, in which William R. Corliss observes:

At NASA budget hearings before Congress, questions about duplication of facilities (between NASA and DOD) are as inevitable as the cherry blossoms outside.

Elaborate international agreements were signed with every nation in which the United States established a tracking station. In addition, Congress also encouraged agreements for the dissemination of scientific data obtained from nearly all space-related experiments.

ANFUSO ADVOCATES MORE COOPERATION

Starting in the very first year of its existence, the committee members pursued an active schedule of addresses to foreign groups, attendance at panels and symposia in other nations, and encouragement to scientific efforts abroad. One of the most active internationalists on the committee—and one of the best-traveled—was Congressman Victor L. Anfuso (Democrat of New York). Anfuso, accompanied by several other committee members and staff, toured Europe in the fall of 1959, spreading encouragement wherever they went, and in particular at the 10th Annual Congress of the International Astronautical Federation in London. Congressman Anfuso, after visiting a number of European scientific research facilities, issued a call for closer United States-European collaboration in scientific research and development. He also asked Chairman Brooks and Senate Majority Leader Lyndon Johnson to call a special joint meeting of the House and Senate committees in the fall of 1959 to chart a cooperative course. The ambivalence in the twin goals of American preeminence versus cooperation was expressed this way in Anfuso's letter:

The Soviet outer space race offers threat that discoveries may be diverted to war purposes, thus endangering the whole world. * * * We should only engage the Soviets in special projects such as cooperation in the peaceful exploration of outer space to determine whether coexistence is possible. (We must) determine direction and money needed to unite exploratory research and development programs in space sciences under a single head, avoid unnecessary duplication, and to surpass the Russians.

Chairman Brooks threw cold water on Anfuso's proposal for a joint meeting, responding:

I wish to call to your attention the fact that you are the only one who has indicated an interest in such a meeting. None of the other committee members has indicated an interest, and, frankly, I am not prepared to go along with you in this proposal.

Speaker Sam Rayburn was even blunter in his response to Anfuso's gesture, and answered the New York Congressman in this way:

We must get on our toes and stay there unless we are to be swamped by Russia.

Undaunted, Anfuso issued an enthusiastically optimistic subcommittee report entitled "Outer Space the Road to Peace" which was published in 1960 as a committee print. He entitled several public addresses his own "Crusade for Peace" through international cooperation in space.

THE U-2 FIASCO

When NASA announced in June 1959, that it was using a new Lockheed U-2 to investigate atmospheric turbulence between 20,000 and 50,000 feet by overflying the United States, England, Japan, western Europe, and Turkey, only aviation and meteorological circles seemed interested. Then when NASA held a press conference on May 5, 1960, to announce the loss of a U-2 over Turkey on a "weather mission," it signaled an international incident which embroiled the committee. Premier Khrushchev announced to the Supreme Soviet that pilot Francis Gary Powers had been shot down over Soviet territory and had confessed he was employed by the CIA. Khrushchev demanded to know if President Eisenhower had ordered the spy flight. The scheduled summit meeting booked for Paris later in May was abruptly canceled. Khrushchev noted that Powers and his U-2 had been shot down by a rocket while flying at 65,000 feet altitude, and the U-2 carried electronic gear to detect Soviet radar installations.

Two members of the committee demanded that the committee investigate the involvement of NASA. In a telegram to Chairman Brooks on May 10, Anfuso pointed out:

NASA was formed by Congress mainly to carry out peaceful projects and to promote international cooperation in peaceful uses of outer space. To gain world confidence it must have no connection with military objectives. Recent disclosures impair my activities as Congressional Adviser to the UN, also activities of the Subcommittee on International Cooperation of which I am Chairman, as well as the prestige of your entire Committee. We must do everything possible to dispel any mistrust on the part of other nations. NASA must confirm its peaceful purposes before the Summit Conference.

Freshman Congressman Leonard Wolf (Democrat of Iowa) also challenged Chairman Brooks and expressed concern "over revelations that NASA is being used as a cover for spying activities by the CIA." Wolf added:

I do not believe the Nation can afford to let Congress follow the bumbling and irrational leadership of this Administration. It is our manifest duty to insist that moneys * * * are used in strict compliance with the law as stated by Congress.

Wolf urged a full-scale investigation by the committee to determine if NASA was involved in other, similar activities and in "what other instances NASA has given out information which is at variance with the facts."

Chairman Brooks declined to conduct a committee investigation. He told both Anfuso and Wolf that "I have been briefed on this matter, and if you will call at my office, I will be glad to convey such information as I have on an off-the-record basis." Under pressure from the two Congressmen, Chairman Brooks called an executive session of the

committee. Those attending expressed the consensus that a public investigation of the U-2 incident would only embarrass NASA. Chairman Brooks agreed to make the facts on which he had been briefed available to any committee members in strict confidence, closing the book on the embarrassing incident. Years later, the President's Science Adviser, Dr. James R. Killian, Jr., wrote in *Sputnik, Scientists, and Eisenhower*:

The whole episode of the shooting down of the plane—the timing of the flight, the confused reaction of the American government and the untruthful statements it made—seems incomprehensible today.* * * There were serious disagreements in the White House staff in regard to how to respond to the news.* * * The President himself accepted full responsibility for the flight.

A COMMITTEE DIVIDED

The U-2 fiasco and the sensational orbiting flight of Yuri Gagarin in April 1961, combined to push efforts toward cooperation into the background. Among committee members who attempted to stimulate greater cooperation, Anfuso, Fulton, and Miller were the leaders. Anfuso's visit to the Soviet Union in September 1959, had made a deep impression on him. He reported to his colleagues that he had talked with Russian scientists like academician Leonid I. Sedov, and "they said they were willing to cooperate on the peaceful exploration of outer space." In February 1961, Anfuso posed this question to Dr. Hugh L. Dryden, NASA's Deputy Administrator at a committee hearing:

MR. ANFUSO. Since the U.S.S.R. and the United States are the two prime countries that have done the most in this field of space exploration, would you favor a joint conference between an American team and a Russian team to discuss the peaceful uses and exploration of outer space?

DR. DRYDEN. I have on every occasion discussed with the Russians this matter of cooperation. They generally talk about exchange of information as a first step.

The committee was sharply divided on the issue of cooperation with the Soviet Union. Teague and Casey were the most outspoken opponents of cooperation, and they were accurately reflecting the views of their constituents. In his doctoral dissertation on the committee, James R. Kerr furnished the results of a poll he took among committee members in 1961 on attitudes toward cooperation with the Soviet Union on space:

Of ten Members favoring more cooperation nine are Democrats and one is a Republican; of eleven opposing more cooperation four are Democrats and seven are Republicans. There is also a noticeable split based on dividing the Members into urban and rural categories. Of those favoring more cooperation, eight represent urban districts and two rural constituencies; of those opposing more cooperation seven represent rural districts and four represent urban ones.

In 1961, the committee published a 1,476-page compilation of the "Air Laws and Treaties of the World," adding:

It is believed that the publication of national and international flight rules in a single language and a single document will promote the general knowledge and understanding of the air laws of other countries, encourage the adoption of more uniform laws, and eventually assist in accomplishing an international agreement on the peaceful uses of outer space.

Spencer M. Beresford, at that time serving as special counsel of the committee, was the executive editor of the compilation. Despite the hearings and reports on international cooperation which he encouraged, Chairman Brooks continued to be skeptical, as revealed by his remark when Dr. Dryden was describing to the committee the value of Tiros weather satellite photos to Australia:

Dr. DRYDEN. Everybody was happy, and everybody says, give us more Tiros pictures because there aren't any weather stations out in the oceans around Australia.

Chairman BROOKS. That is fine for Australia, but what have we done for the United States? [Laughter.]

INTERNATIONAL SCIENCE ACTIVITIES AND THE NSF

Even prior to the establishment of the Daddario Subcommittee on Science, Research and Development in 1963—the subcommittee which took a paternal interest in the activities of the National Science Foundation—the full committee in annual reviews of the NSF encouraged the support and stimulus given to international science activities by the Foundation. The NSF liberally supported the multinational efforts of thousands of scientists throughout the world under the umbrella of the "International Geophysical Year" which officially ended December 31, 1958.

The committee, and particularly Congressman Teague, strongly supported the multinational effort which the NSF funded in Antarctica. Philip M. Smith recalled in 1978 Teague's deep interest in this international effort, in a personal letter to Teague:

I believe that I recall that our first personal association and acquaintance took place in 1961 when you made a visit to the Antarctic at the time I was associated with the U.S. Antarctic Research Program. I very distinctly recall to this day many of the elements of that visit and your important and penetrating questions as to the future of Antarctica, both scientifically from the standpoints of its natural resources base and political future. On that visit, you expressed your own inherent belief in the importance of science and technology and also the inherent faith that your constituents had in science and technology. I recall your talking through with us your views as to the future of the Antarctic, and importance of the space program, the work of the National Science Foundation, and the practical developments that would take place from all of these investments made by the Federal Government. It was for me, at that time and throughout my career, an important meeting for it gave me much insight at that time into the importance of maintaining a good working partnership between the executive

branch and the Congress and insuring that the people of the United States understand and can participate in the affairs of the Federal agencies that are the sponsors of research and development. I have tried in all of my own work to keep in mind some of the important observations that you made those many years ago.

Smith went on to become Assistant Director for Natural Resources and Commercial Services of the Office of Science and Technology Policy.

CHAIRMAN MILLER AND INTERNATIONAL COOPERATION

Before Congressman Miller became chairman of the committee in September 1961, he began as the ranking majority member to tilt the committee's influence toward firmer support of international cooperation. Miller was far more comfortable with visitors from other countries than Brooks. Also, he loved to travel, to give speeches, and to extend greetings at international conferences and on foreign visits. In 1960, Miller traveled to the 11th annual meeting of the International Astronautical Federation in Stockholm, Sweden. Although somewhat miffed that he was not officially on the program and found that committee staffer Spencer M. Beresford was ticketed to deliver two papers on "High-Altitude Surveillance in International Law" and "Principles of Spacecraft Liability," Miller used the opportunity to cement relationships with scientists from many nations. He also spent considerable time on behalf of the committee in a series of conferences to stress the importance of the American scientific attaché program, which in 1960 had been extended to only ten of our embassies. Miller urged expansion of the program to advise our ambassadors on matters of science policy, as well as establish a liaison with scientific organizations and developments in foreign countries.

RADIO ASTRONOMY, COMMUNICATIONS, AND WEATHER SATELLITES

In 1961 and 1962, the Hechler subcommittee held a series of three hearings on radio astronomy, communications satellites, and weather satellites, in the course of which a number of recommendations were made to expand the work in these three areas for the benefit of people throughout the world. In March 1962, Hechler was disturbed by remarks made by Sir Bernard Lovell, director of the Jodrell Bank Experimental Station, before the committee's Panel on Science and Technology to the effect that radio astronomers were subjected to many atmospheric interferences from man's increasing use of the radio spectrum. The subsequent hearings zeroed in on this point, and in its report the subcommittee recommended that more bands be allocated by the International Radio Conference for the exclusive use of radio

astronomy. The limitless possibilities for active international cooperation in sharing the benefits from weather and communications satellites were reviewed by the Hechler subcommittee in its hearings and reports in 1962. From that point forward, when the jurisdiction in these areas passed to Karth's Subcommittee on Space Science and Applications, strong support for these and other applications projects was furnished by the committee. The worldwide benefits, while not as spectacularly visible as manned space flight, extended to peoples on all continents and afforded prime examples of international cooperative effort.

NASA Deputy Administrator Dryden briefed the committee every year on attempts to achieve breakthroughs in scientific cooperation with the Soviet Union, as well as the broader and rapidly expanding relationships with other nations. Through the International Committee for Space Research (Cospar), American scientists mixed freely with those of other countries, and the United States funneled complete scientific data on its launchings and research results to Cospar. Many nations also responded to the American offer through Cospar to cooperate with other nations in the launching of satellites.

INTERNATIONAL SATELLITES

In 1962, Dr. Dryden reported to the committee the successful launch of NASA's first two international satellites: Ariel, launched with a scientific payload for the British, and Alouette for the Canadians. He also told the committee of the launchings of sounding rockets bearing scientific payloads in cooperation with 8 countries, and that 37 nations were engaged in special projects in support of our weather and communications satellite programs. In addition, NASA reported a new international fellowship program which had been successfully established in American universities. The Canadian and British satellites provided valuable data on the ionosphere, the ionospheric environment, and solar radiation. Dryden also reported to the committee in 1963:

The record of foreign visits to NASA installations bears testimony to the rapid growth of interest in space activities abroad. In this connection, I might note that NASA, with the concurrence of the Department of State, has established contact with the two new regional organizations provisionally established in Europe during the past year, the European Space Research Organization (ESRO), and the European Launcher Development Organizations (ELDO), and that our readiness to consider cooperative arrangements of mutual interest has been conveyed to them.

COOPERATION WITH THE SOVIET UNION

Dr. Dryden, who died in 1965, steadfastly devoted the last years of his life to establishing cooperative relationships with the Soviet

Union. It was a slow and tortuous journey, strewn with minefields and booby traps, and Dryden's deep and active interest in religion probably instilled in him the patience of Job in carrying out his efforts. In an extended series of conversations with academician Anatoliy A. Blagonravov, Dr. Dryden, with strong support from some members of the committee, carefully sowed the seeds of mutual trust and cooperation. Chairman Miller in particular encouraged the building of stronger ties with all nations. He invited Sir Bernard Lovell to participate in the Panel on Science and Technology in 1962, and in 1963 asked Prof. Pierre Auger of France, executive secretary of the European Preparatory Commission for Space Research, to keynote the Panel meetings. Miller also transmitted his private encouragement and support to all those here and abroad who were working toward greater international understanding through the medium of science. Meanwhile, President Kennedy was boldly and actively throwing the full prestige of the White House behind efforts toward closer cooperation with the Soviets and all nations interested in science and space. When Khrushchev relaxed his inflexible demands that disarmament must precede any scientific cooperation, Chairman Miller publicly stated on February 23, 1962:

This is something we must do. We must accept their offer in good faith unless, and until, proven otherwise. The world expects this of us.

A NEW TUG OF WAR OVER COOPERATION

Within the committee, a tug of war was taking place over the issue of whether or not to cooperate with the Soviets. Chairman Miller continued to receive strong support from Fulton on the Republican side, as well as the third-ranking committee member, Anfuso. However, Teague began to counterattack in 1962, and as the ranking majority member of the committee and chairman of the Manned Space Flight Subcommittee, he carried a prestigious voice. On April 18, 1962, Teague introduced a concurrent resolution which bluntly proclaimed:

Resolved by the House of Representatives (the Senate concurring) that it is the sense of the Congress that the United States should not participate in any program for the exploration of space with foreign nations or international bodies which involves the disclosure of information concerning our advances in space technology, unless the Soviet Union by positive actions (rather than unfulfilled promises) (1) participates in an inspection system for armaments as a part of a program of international disarmament, and (2) makes known to the world information, hitherto secret, which it has obtained in its program of space exploration.

Reflecting the strong feelings of his Texas constituents, Teague publicly added:

I think it is dangerous for the United States to enter into cooperative programs with the Soviet Union in scientific areas where the Soviet Union has made little

progress, unless there is some substantial evidence of good faith on the part of the Russians. * * * It is not possible to separate completely the peaceful and military implications of space technology. I see no reason why we should enter into arrangements with the Soviet Union or other international bodies which would result in our disclosing great quantities of important information in the areas in which we hold the lead and in which it appears Russia has done little.

On April 24, 1962, Anfuso fired back in a public address which reiterated:

International cooperation in outer space should be fostered and expanded with vigor, especially between the United States and the Soviet Union. If these two nations work at cross purposes in the exploration and use of outer space, all mankind will be the losers. Working together in a spirit of cooperation, however, they can immeasurably benefit not only themselves but all humanity.

Anfuso also reminded his listeners that he had already proposed "that an international team, including Soviet as well as American participation, join hands for the manned exploration of the Moon. * * * At the time I made this suggestion, it was regarded in some quarters as unrealistic or even radical. Now it is under serious study by both countries."

Anfuso's proposal, as noted on pages 174-176, sparked a new public debate when President Kennedy in 1963 addressed the United Nations and urged a joint American-Soviet effort for a manned flight to the Moon.

Kerr's doctoral dissertation records Fulton's 1962 view of the controversy in these terms:

I am diametrically opposed to Teague who puts a low ceiling on space. Fulton puts a high ceiling on space. Fulton wants open skies, cooperation in space exploration, and defense of space spending in terms of peaceful uses. With open societies and open space exploration, cooperation will be enhanced, not impeded by distrust. The containment attitude toward the Soviet world is wrong in this case. We should press for maximum cooperation rather than foster an attitude of distrust and suspicion. Disarmament is a separate matter—it can only start on a small scale.

Although the committee was divided, the official positions which Anfuso and Fulton held in United Nations discussions, as well as the many behind-the-scenes efforts and foreign contacts made by Chairman Miller helped swing far stronger committee influence on the side of cooperation. Miller hailed the bilateral agreement between the United States and the U.S.S.R. in 1963, pledging cooperation in meteorology, mapping the Earth's magnetic field, and endorsing a passive communications satellite experiment.

THE OUTER SPACE TREATY OF 1967

The departure of Anfuso at the end of 1962 to become a judge left Miller and Fulton as the leading internationalists on the committee.

Speaker McCormack appointed both men to be advisers to the United Nations Committee on the Peaceful Uses of Outer Space. In July 1966, Miller joined delegates from 28 nations in Geneva, Switzerland, to take part in the negotiations for the space treaty which the United States signed and was ratified by the Senate in 1967. The treaty banned the orbiting of nuclear weapons and weapons of mass destruction in space, provided that sovereignty over planets could not be claimed by individual nations, and forbade military bases and fortifications on the Moon and other celestial bodies. In an address on March 15, 1967, Miller commented:

The most impressive aspect of the agreement is that it was formulated out of the same philosophy that guided the Congress in 1958 when it enacted the Space Act. The common interest of all mankind in the progress of exploration and use of outer space for peaceful purposes, that space exploration should be for the benefit of all peoples, that cooperation in space will contribute to the development of mutual understanding and to the strengthening of friendly relations between States and Peoples—all these and more constitute the basic fabric of the treaty.

Working through the National Science Foundation, the committee also encouraged support in the mid-sixties for the International Indian Ocean Expedition and the International Years of the Quiet Sun.

With the death of Dr. Dryden, the committee's central contact on international developments was Arnold W. Frutkin, who served as NASA's Associate Administrator for External Relations. Reflecting in 1978 on the committee's interest in international scientific cooperation, Frutkin wrote:

It was my impression that this interest rested on the committee's perception that NASA's international programs established a basis for important scientific and technical contributions by foreign agencies to the U.S. national space program, with the unique feature that these activities were self-funded by the foreign participants and, therefore, operated to reduce our budgetary requirements. There was, I believe, a concomitant appreciation of possible political benefits in such collaboration, albeit intangible.

COMPETITION VERSUS COOPERATION

Throughout the period, the committee kept the Congress fully informed concerning new developments in international cooperation. Yet as a general rule most Members of Congress seemed more interested in the competitive aspects of the program. Like the grade school students in Ethiopia mentioned at the start of this chapter, their major focus was on the burning issue of whether the United States would beat Russia to the Moon. So it came as a surprise in 1966 when Representative Paul Findley (Republican of Illinois) arose to ask what progress was being made along cooperative lines with NATO nations.

After describing at some length the activities of ELDO, ESRO, and the satellite and sounding rocket projects being developed with other nations, Congressman Fulton suddenly was stopped in his tracks by this query from Findley:

Has any thought been given by the committee to placing the program on a multi-national basis so that the cost perhaps could be more equitably shared by other people than at present?

Fulton responded that this would be too large for the budgets of other nations, adding:

The problem in that regard is that the United States is quite advanced in space. We have tremendous amounts of funds being used in space compared to the amounts being provided by other countries. It would be like hitching an elephant to a rabbit.



Representative John W. Davis (Democrat of Georgia), left, joins Dr. Luigi Broglio (center), president of Italian Space Research Commission, and Dr. Franco Fiorio, who served as chairman, United Nations Working Group on Remote Sensing of the Earth by Satellites. Both Italian visitors were guests at a session of the committee's Panel on Science and Technology.

INFLUENCE OF THE PANEL ON SCIENCE AND TECHNOLOGY

Throughout the 1960's and through 1972, at the end of which he left Congress, Chairman Miller continued to stress international participation in the committee's Panel on Science and Technology. In 1965, Prof. Luigi Broglio of Italy, president of the Italian Space Research Commission, served as a guest panelist in the discussion of "Aeronautics." In 1966, Lord Snow, joint parliamentary secretary, Ministry of Technology, British Government, was a guest panelist.

Fulton, who always tried to inject a little offbeat humor into the atmosphere whenever it got too dignified, welcomed Lord Snow with these choice remarks, interspersed with more laughs on his own part than he was able to get from his audience:

I want to tell Lord Snow that, being a newspaperman, I called the British Embassy to get information on your trip. I had a conversation with a very bright, sprightly young lady on the telephone and I said: "I am from the suburban newspaper in Pittsburgh, and I want to get something on Snow."

She said: "Snow, snow? We have enough problems around here without snow. Now that you asked, this morning on getting in here I jolly well wished I was back in good, old England. You can keep your snow."

In 1967, the central subject matter of the Panel was devoted to "Government, Science, and International Policy," with Secretary of State Dean Rusk keynoting the Panel. To help lead the discussions and participate with the Panel, Chairman Miller invited representatives from Brazil, Switzerland, the Netherlands, Japan, Norway, Austria, and India.

Secretary Rusk emphasized three points in his keynote address:

We can make better use of new techniques for technological forecasting as an input to foreign policy judgments.

New understandings and mutual respect between the physical sciences and the social sciences are prerequisites if the gap between them is to be completely closed.

We must have programs of international scientific and technical cooperation on two levels: With the advanced nations in understanding and controlling the total environment; and with those nations in assisting the material progress of the developing nations.

Dr. Philip Handler, who moderated the Panel, made these comments in introducing the foreign visiting panelists:

Their very lives are testimony to the fact that they share the principal articles of faith of the scientific community everywhere; first, that the pursuit of an ever more penetrating understanding of man and the universe in which he finds himself—the search for truth, if you prefer—is of itself one of mankind's noblest aspirations.

Second, that the application of scientific truth in the development of ever more powerful technologies is one of the chief instruments by which we may hope to alleviate the condition of man.

Chairman Miller was ecstatic with the results of the 1967 Panel. In a private letter to Secretary Rusk, he exulted:

Your keynote address was perfectly tailored to the international flavor of our theme, and served to enhance the meeting by setting the stage for what proved to be a most stimulating and profound series of discussions.

IMPROVING MANAGEMENT OF INTERNATIONAL SCIENCES

On May 7 and 8, 1967, the Panel held an unusual series of executive sessions, charged with coming up with recommendations for improving the management of international scientific affairs by Federal agencies. It was a monumental task, and a subcommittee including Drs. Roger Revelle, Harrison Brown, and Philip Handler came up with a series of recommendations which were aired in a further executive session of the Panel with the committee on January 25, 1968. The Panel agreed that clear-cut efforts should be made to enhance the importance of science attachés in American embassies throughout the world. In its report it was also stated:

The Panel also stressed the international character of science, the importance of international scientific and technological communication, and the potential role of scientific collaboration in bringing nations closer together. * * * Attachés should get to know the scientific communities to which they are assigned and they should constantly search for means by which the local scientific community can be brought into closer contact with the scientific community in the United States.

There was considerable discussion at the executive session of the jealousy of higher ranking Foreign Service officers toward the intrusion of the newer, "strange breed" of science attachés. Congressman Daddario related that in a discussion at the Foreign Affairs Institute, he ran into a buzz saw of opposition from senior officials:

One of these men in opposition to it said that "We don't have any vacancies and we ought not to create more because we have enough." I suggested probably we should get rid of one of the ones they had and one of the younger fellows said: "I have some recommendations."

The upshot of this discussion was that Daddario wrote a strong letter to President-elect Nixon on November 26, 1968 urging the upgrading of the international scientific affairs activities in the State Department:

I am convinced, as are a number of my colleagues here in Congress, that the potential of science and technology as a tool of diplomacy has never quite been grasped heretofore by any administration. * * * I do urge you to give consideration to placing this program at the Assistant Secretary level and to emphasize its importance by securing the highest possible professional competence to implement it.

The assistant secretaryship was eventually established in 1974, and the committee continued to work effectively to raise the stature of the science attachés.



Lady Jackson (Barbara Ward), foreign affairs editor of "The Economist," enlivens a committee panel meeting with a humorous aside. Presiding is Chairman Miller.

APPLIED SCIENCE AND WORLD ECONOMY

Continuing the international theme in 1968, the Panel had as its theme "Applied Science and World Economy", featuring Lady Jackson (Barbara Ward), foreign affairs editor of "The Economist" in London, as well as Dr. O. M. Solandt, chairman of the Science Council of Canada, and Dr. Jorge A. Sabato, technology manager of the National Commission for Atomic Energy in Argentina. The 1968 Panel was keynoted by George Woods, president of the International Bank for Reconstruction and Development. Speaker McCormack, a regular visitor to the Panel meetings, noted in his introductory remarks:

Science can be the servant of all humanity in helping us to live together in peace, and to prosper despite the rising difficulty of many problems which we face on this

planet. America is a part of the world community, and whether we progress, or whether we slide backward, this cannot be in isolation from what happens to the rest of the family of nations sharing the land, the seas, the atmosphere, the resources, the problems of this Earth.

When it came time for the 1969 Panel meeting, which had as its subject "Science and Technology and the Cities," Chairman Miller invited as guest panelists participants from Greece, Japan, Yugoslavia, England, France and the Netherlands. At the 11th meeting of the Panel in 1970, on the subject of "The Management of Information and Knowledge", guest panelists included representatives from England, Mexico, and Finland. In 1971, the Panel concentrated on "International Science Policy," and Secretary of State William P. Rogers in keynoting the three-day meeting, stated:

For more than a decade now this committee has performed an important service by bringing together every year some of the best scientific minds of the world to discuss problems of great relevance to the future of mankind. Science and technology have come to play a role in international relationships far beyond what any of us would have anticipated even a generation ago.

A representative of the Soviet Union, Dr. Viktor A. Ambartsumian, served as a guest panelist; coincidentally he was also serving as president of the International Council of Scientific Unions. Other guest panelists in 1971 included representatives from Italy, Sweden, France, Canada, Kenya, and Pakistan.

At the last meeting of the Panel in 1972, on a subject which had international as well as domestic overtones—"Remote Sensing of Earth Resources"—Chairman Miller followed out his practice of inviting several international guest panelists from Brazil, Italy, Australia, and Germany. Miller observed in his opening remarks:

We have invited several very distinguished gentlemen who represent the interests of foreign nations, and we have asked them to lead the discussion of the international implications of remote sensing systems.

The Panel was fortunate in having as a guest participant Dr. Franco Fiorio, chairman of the United Nations Working Group on Remote Sensing of the Earth by Satellites, since the emerging value of Earth resources satellites presented many international implications with which the United Nations was already beginning to grapple.

INTERNATIONAL VISITS

Under the aegis of the Daddario subcommittee (see chapter V, pages 155-157) a number of additional steps in international cooperation were taken, including the active sponsorship by the committee of the international biological program. Chairman Miller also encouraged a steady stream of committee visits to other nations to at-

tend international conferences, confer with scientific leaders in other nations, and visit scientific installations in other countries. Although a majority of these visits were undertaken by the Daddario subcommittee in the 1960's, there were significant exceptions such as the large committee delegation which visited Australia in 1964, a subsequent visit by Congressmen Hechler and Roush to Spain, South Africa, and Australia in 1965, and a special mission to Moscow by Congressman Roush in 1967. Roush, designated by Chairman Miller to chair a special ad hoc Subcommittee on International Commercial Standards in 1966, attended the Moscow meeting of the "International Organization for Standardization" in June 1967. Some 56 nations were represented in this organization whose aim is to promote the development of standards in the world in order to facilitate international exchange of goods and services.

SURVEY OF INTERNATIONAL SCIENCES

Early in 1967, the Daddario subcommittee requested the Library of Congress to compile a report on "The Participation of Federal Agencies in International Scientific Programs." Philip B. Yeager of the committee staff had many conferences with the Science Policy Research and Foreign Affairs divisions of the Library during the preparation of the report, a 167-page document which furnished excellent background for the Panel and a springboard for further committee activities in the international field. It was the first time that a comprehensive survey of international science had been furnished to the Congress. The distinctive character of the report was that it did not simply list and compile agencies and programs to read like a telephone book, but it emphasized important highlights in the involvement of Federal agencies in international scientific activities.

The 1967 report led off with a discussion of the National Academy of Sciences, characterized as "one of the Nation's most effective instruments in international science." The committee worked closely with the National Academy of Sciences and its president, Philip Handler, as a focal point for furnishing stimulus, leadership, and support for activities in this area. It also covered a complete listing and analysis of the many international organizations with scientific activities in which the United States takes part, as well as the huge variety of international scientific projects undertaken by the numerous Federal agencies. Subsequent reports covered annual developments in international scientific policies.

CHAIRMAN MILLER AND THE COUNCIL OF EUROPE

The ubiquitous Chairman Miller journeyed on May 8, 1967 to Strasbourg, France, where he spoke before the Council of Europe,

composed of parliamentarians from Western European nations interested in international cooperation. Reflecting on his trip, Miller commented:

It was made very plain to me that the Council is deeply concerned over the role that parliamentarians can play in overcoming some of the disparities presently existing within the United States and Europe in scientific and technological fields. This was a very rewarding experience for me. It was also the source of some satisfaction, since I believe the activities of the Committee on Science and Astronautics have shown the way.

On November 6, 1967, Chairman Miller, Congressmen Teague and Daddario, and staff assistant Richard Hines took part in the ceremonies dedicating the Cerro Tololo Inter-American Observatory, at La Serena, Chile. Dr. Handler recalled the trip in a 1978 letter to Teague:

Another favorite memory is our trip to Chile to dedicate the Cerro Tololo telescope. It was a long haul down and back and I marveled that you and George could find the time and have the patience to lend yourselves to that act of diplomacy and international science. Little did we know that President Frei, who joined us on the mountain, was all that preserved democracy in that torn country and that, after him the dark would fall. I vividly remember the sense of wonder on his face as he peered through the first telescope installed there and his saying: "The political leader of every nation should spend a night here once a year, pondering that immense spectacle, so as to place himself in perspective and learn the humility he must have if he is to guide his people."



Chairman Miller at the confrontation meeting with the OECD in Paris, France. From left Dr. Ivan L. Bennett, Jr., President's Science Advisory Committee; Herman Pollack, Department of State; Dr. Philip Handler, President of National Science Board; Dr. Donald F. Hornig, President's Science Adviser; David Beckler, Assistant to Director, Office of Science and Technology; William D. Carey, Bureau of the Budget. Philip B. Yeager of the committee staff is seated in rear between Chairman Miller and Dr. Hornig.

CONFRONTATION MEETING WITH THE OECD

Chairman Miller, accompanied by staff counsel Philip B. Yeager, traveled to Paris in January 1968 to represent Congress on the U.S. delegation headed by Presidential science adviser Donald F. Hornig for a "confrontation meeting" with the Science Policy Committee of the Organization for Economic Cooperation and Development. For several years, OECD had sponsored searching analyses of science and technology policies in a number of nations, and their biggest project involved the United States. A special feature of all OECD reviews was the "confrontation meeting" at which the OECD examiners go over their findings with the scientific officials of the nations being analyzed. In its report, OECD gave high marks to Congressman Daddario:

The Subcommittee for Science, Research and Development is under the Chairmanship of Representative Emilio Q. Daddario who, in a few years of office, has acquired a very considerable reputation and is an admirable example of the younger generation of parliamentarians who, by their profound knowledge of scientific affairs, have rapidly reached outstanding positions. * * * In the eyes of many observers, the Daddario Committee has established itself as one of the foremost champions of the cause of science in Congressional circles.

Although Dr. Hornig led most of the responses at the confrontation meeting, Chairman Miller did get in a few licks. The report commented on the "pluralism" of scientific programs, and Miller observed that the rejection of a Department of Science did not mean a general rejection of science, which had strong support in Congress. On the issue of post-Apollo efforts toward better international cooperation, Miller cited the language of the 1958 Space Act and pointed to the expanding number of bilateral agreements which were being developed. The delegates were asked what they felt about President Eisenhower's warning in his farewell address concerning the "military-industrial complex." Miller responded:

I have no fear that an industrial complex is going to worry our country. Under our system anybody has the right to come to Washington and tell us what his troubles are all about. I think if you analyze it carefully this problem was maybe somewhat over-emphasized. The congressional committees watch things very carefully and by their contacts with the agencies are very able to tell if the country is getting service for its money or not.

U.N. CONFERENCE IN VIENNA

In 1968, Miller and Fulton, accompanied by Col. Harold A. Gould, traveled to Austria, Yugoslavia, Switzerland, Spain, and Portugal. At Vienna, Miller and Fulton served as congressional advisers to the U.S. Representative to the United Nations Committee on Peaceful Uses of Outer Space. The U.N. Conference in Vienna was attended by 500 delegates from 74 nations. One of the big surprises at the

Conference was the announcement by Soviet Premier Alexei N. Kosygin that Soviet bloc nations would establish a new Comsat network, "Intersputnik," to compete with the American supported Intelsat which already had 62 member nations and was successfully handling 95 percent of the total international telecommunications traffic.

At Belgrade on August 28, Miller addressed a conference of State Department attachés assigned to American embassies in Europe, at the invitation of Herman Pollack, head of the State Department's Bureau of International Scientific and Technological Affairs. At the time, American annual expenditures for research and development had reached a peak of \$17 billion a year and were starting their long decline (in real dollars). Miller referred to the golden years in these terms:

In our time all of us have witnessed the creation and growth of a new and exciting period of history—the dynamic era of science and technology. Practically every scientific discipline has experienced an explosive growth that is entirely unprecedented.

Miller told the assembled attachés:

The Committee on Science and Astronautics has been consistent in their view that international cooperation in scientific research should receive more emphasis. * * * As a word of caution, I feel that we should not anticipate any appreciable expansion of Federal support to individual foreign scientists unless this should become an important factor in the establishment of foreign policy and foreign relations.

In his address at Belgrade, Miller posed three conclusions:

First, science and technology have become an integral part of foreign policy.

Secondly, the Congress, as evidenced in the NSF Act of 1968, has endorsed the thesis that where research services are unavailable in the United States or can be better or more economically done abroad, foreign services should be used and supported regardless of location.

And lastly, our experience over the past 10 years has shown that science is one area in which it is possible for all countries, regardless of their political philosophy, to communicate. A review of our most important treaties during this time will reveal that they have largely been those associated with scientific or technological matters.

SCIENTIFIC COOPERATION WITH CANADA

During the 1960's the committee and its staff enjoyed numerous contacts with scientific visitors from other countries, as well as building up good relationships with scientists during the many trips made to conferences, international meetings, and scientific installations located in foreign nations. It was quite natural that the embassies in Washington should be a focal point for the committee in its relationships with those men and women in other countries who were in-

terested in science and technology. Customarily, the committee got to know which individuals in the embassies were specialists in the areas on which the committee concentrated.



Dr. O. M. Solandt, Chairman of the Science Council of Canada, addresses the committee's Panel on Science and Technology.

So far as Canada was concerned, the principal contact in the Canadian Embassy was J. W. ("Ward") Greenwood. In making plans for the January 23-25, 1968, Panel on "Applied Science and World Economy," the committee invited Dr. O. M. Solandt, Chairman of the Science Council of Canada, to present the main paper on Wednesday morning, January 24, 1968. Dr. Solandt addressed the Panel on the subject of "The Utilization of Scientific and Technical Resources in Canada." He noted that the Science Council had only been in operation a little over a year. He described it in the following fashion:

It is somewhat similar to your President's Science and Advisory Committee. It is directly advisory to the Prime Minister, and the Cabinet.

Shortly after Dr. Solandt's acceptance had been received, Ward Greenwood telephoned Colonel Gould on November 17, 1967, to alert him to the fact that the Canadian Senate had just passed a resolution "to enquire into the Scientific Establishment in Canada". He asked Colonel Gould about details of Dr. Solandt's participation in the Panel. Colonel Gould responded on November 20 with more specifics, noting that Dr. Solandt had accepted the invitation, and that additional

visitors from Canada would be welcome. Then on November 29, Hon. John J. Connolly, the leader of the Government in the Canadian Senate, wrote to Chairman Miller and other committee members, with further material about the Senate investigation. Chairman Miller answered in a three-page letter, inviting any Canadian Senate members who wished to attend the January Panel, adding:

I was most interested to learn of the appointment of a Science Committee in the Canadian Senate. In the era of rapid technological change in which we find ourselves, it is of paramount importance that legislative bodies maintain close oversight of science in general as well as technological development. Science, public policy and national economy are so inextricably woven together in the present day that careful monitoring of scientific activities by all instruments of government is essential to national progress.

The committee shipped a set of hearings, reports and other documents relating to its work, thus enabling the Senate committee to get the necessary guidance to undertake a much more thorough inquiry. Not wishing to be upstaged on short notice by the executive branch, the Canadian Senators decided the better course of action would be to wait for a good opportunity to visit the Science Committee on their own when the searchlight was directed squarely on the legislators from the two countries. In response to a "feeler" concerning such a meeting in Washington, Congressman Daddario answered positively on March 26, 1968:

I personally feel that it is very encouraging that other parliamentary bodies are beginning to set up specialized groups in this field. It cannot help being beneficial, as I view it, in the advancement of new means for assessing technology. And, as you have stated, we consider this to be one of the most critical problems confronting us as legislators.

VISIT OF CANADIAN SENATORS

Election year made it impossible to agree on a convenient meeting time during 1968, but on May 8, 1969, 15 members of the Special Committee on Science Policy of the Canadian Senate met with the Daddario subcommittee. Chairman Miller reported enthusiastically on the results, in an address to the House of Representatives on May 13:

So far as is known this was the first meeting of its kind, although it was not a formal proceeding of the Congress.

The Canadian committee was headed by Chairman Maurice Lamontagne, of Quebec, and met with the Science Subcommittee, headed by the gentleman from Connecticut, Representative Daddario, and other members of the committee.

The legislators of the two committees discussed a variety of mutual problems as well as legislative mechanism for handling the great potentials and dangers posed by a rapidly developing technology. I should like to emphasize my belief that, as this meeting and our space efforts have shown, the unique character of science makes it a useful tool for the assistance of diplomatic missions as well as for intrinsic merit.

Chairman Miller remarked it was the first time that a Canadian Senate committee had conferred as a group outside its own country. But an even more colorful and useful dialogue occurred February 9 and 10, 1970, in Ottawa, when the Canadian Science Policy Committee held a joint public meeting with four members of the Science and Astronautics Committee in the hearing chambers of the Canadian Senate. Chairman Miller was suffering from a bad cold and had to cancel at the last moment, but Congressmen Daddario, Fulton, Symington, and Mosher ably bore the colors for the Science Committee. Also making the trip with the committee were staff consultant Dr. J. Thomas Ratchford and Herman Pollack of the State Department.

THE POLITICAL RISKS OF INTERNATIONAL ISSUES

Daddario, who like a number of other able committee members was to be defeated at the polls in his try for a different office, commented optimistically on what he felt was increased public support for scientific issues such as improving the environment. In his informal remarks to the Canadian committee, he observed:

Up until recently it was very difficult to get people to be concerned over scientific matters. It was difficult to get people to be disturbed about the second order of consequences of our technology. There is not a man on the committee who has not from time to time spoken out on those problems, has found them in truth not to be the kind of issues, important as they are, to have the political appeal to develop around them the kind of public opinion necessary to make headway in the legislative arena.

Suddenly things have begun to fall in place, and I think that is important.

Daddario went on to deplore the "budget cutting" which seemed to affect basic research first, and also choke off new opportunities for young scientists on which the future of the Nation depended. He drew a responsive note from Canadian Senator Allister Grosart as he described the parallels between the Science Committee experience in getting reluctant scientists to talk casually and frankly with politicians. Senator Grosart immediately responded:

This is true. We had some quite adamant refusals from some quite important public bodies to appear, but after awhile it became fashionable to appear before the Science committee and almost a status symbol.

The interchanges between the science committees of the two countries furnished yet another example of the international character of science itself. In extemporaneous remarks, Fulton waxed lyrical about this concept:

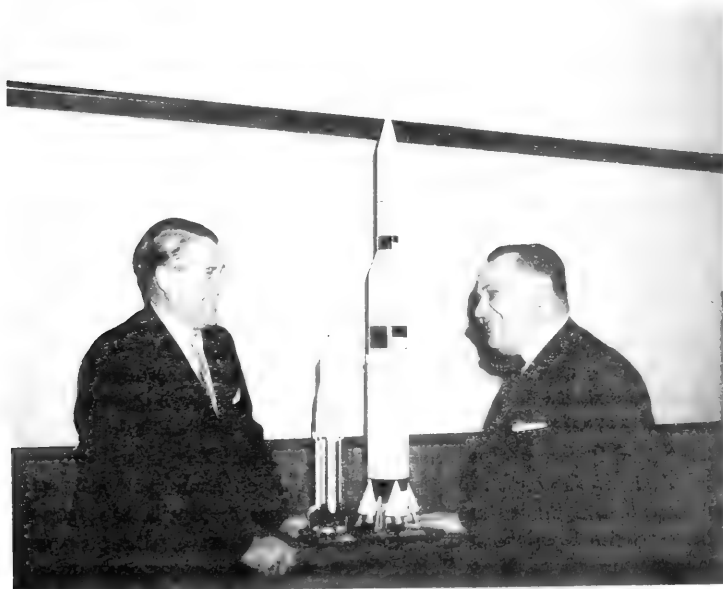
As I was sitting here, I was thinking: this is your land. It is our land too. It is your Canadian land and it is our American land, because we share this continent. We are the peoples that own it and live here. I almost started out by saying: "Fellow polluters of the Great Lakes basin." Unless the Government rises and takes a look at the environmental problems, just as your Senators are doing, the country and the

people are going to be left just as people were left with the heritage of the Sahara Desert. Do not blame it on the goats. No, blame it on the people.

Following the 1969 and 1970 meetings, the committee maintained continuing contacts with their Canadian friends. For example, a featured speaker at the committee's 1971 Panel was Senator Grosart, who delivered a paper on "The Legislative Role in Science Policy." In discussing the work of the Senate Committee on Science Policy, Senator Grosart made these delightful remarks about the American system:

We have of course looked at the very, very complex mechanism which you have in your country for the control of science, and with great complexity, but with great admiration. We ascribe it to that well-known American genius in developing checks and balances and coming up with a system which in theory makes absolutely no sense, but usually works much better than some of the theoretical structures that on paper make more sense.

Senator Grosart provided the answer to a committee's dream on how to prevent witnesses from overburdening and overstuffing members with excessively long statements. Noting that he had been instructed to provide 100 copies of his statement on short notice, Senator Grosart added that he had to carry the copies with him during three plane changes. He proceeded to elaborate on what a wonderful discipline it would be for every witness to be forced to do the same.



Representative Richard L. Roudebush (Republican of Indiana), right, reviews the Apollo and Saturn programs with Dr. Wernher von Braun.

AMERICAN FLAG ON THE MOON—1969

When Congressman Richard L. Roudebush (Republican of Indiana) offered an amendment to the NASA Authorization Act in 1969, requiring that the American flag and none other be implanted on the surface of the Moon, the amendment was immediately accepted on the House floor by Chairman Miller and Ranking Minority Member Fulton. A somewhat similar amendment had been tabled in committee because it carried the implication that the United States was establishing jurisdictional sovereignty and ownership of the Moon, in violation of the 1967 space treaty. Meanwhile, Roudebush had altered his amendment to indicate the implanting of the flag "is intended as a symbolic gesture of national pride in achievement and is not to be construed as a declaration of national appropriation by claim of sovereignty." The amendment spurred a spirited debate over the international implications involved. Roudebush argued:

Over \$23 billion in hard-earned taxpayers' money will have been spent to carry out this formidable task. In all due fairness to the American taxpayer, it does not seem too much to ask that our flag—Old Glory—be left on the lunar surface as a symbol of U.S. pre-eminence in space to which the citizens of this Nation can refer with pride. * * * History and national pride dictate that our achievements be duly commemorated. I know of no act more significant nor symbolic that would memorialize our achievements than the erection of the "Stars and Stripes" on the surface of the Moon.

Fulton added that "the Russians recently sent the coat of arms as well as a picture of Lenin to the surface of Venus." Symington countered that the President through NASA should have the discretion to direct which flags or symbols should be placed on the Moon. He commented that the placing of Russian symbols on Venus was not a good example to follow, because—

I do not recall that this occasioned the general approbation of mankind. Nor did I realize we were accepting lessons from that particular source in how to win the hearts and minds of men. * * * Jefferson wanted us to maintain "a decent respect for the opinions of mankind." What "respect" does this graceless edict demonstrate for the opinions of nations which produced Galileo, Copernicus, Newton, Einstein, Tsiolkovsky, and other giants in thought and deed? What star or stripe is tarnished on Old Glory by a simple gesture honoring the whole history of man, his collective dream, and his epic persistence without which our own continent might yet be undiscovered?

Miller and Teague pointed out that the American flag was already on the Moon by being painted on the side of the Surveyor spacecraft which had soft landed on the Moon, therefore there was no reason to object to the Roudebush amendment. Representative Allard Lowenstein (Democrat of New York) asked whether Congress would not

trust the President to make the patriotic choice himself, without being ordered by the Congress:

The President quite properly has the authority to decide what he wants done about this matter. I wonder what has been discovered suddenly that suggests the President lacks what it takes to make this particular decision. Is he lacking in patriotism so one cannot trust his decision about the space program? Is his devotion to the flag underdeveloped? Has he been found embracing a Union Jack in secret or abusing the memory of Betsy Ross?

But Roudebush clinched the victory when he told his colleagues:

I feel compelled to offer this amendment in view of the many proposals being put forth which advocate that our spacecraft carry to the surface of the Moon the United Nations flag, the flags of other nations, or other emblems or articles symbolic of international cooperation in space exploration.

The Roudebush amendment was carried by an overwhelming chorus of "ayes" on a voice vote.

ESTABLISHMENT OF THE INTERNATIONAL SUBCOMMITTEE

In the early years of the committee's existence, Chairman Brooks, as has been noted, preferred to follow the practice of the Armed Services Committee and designate subcommittees by numbers rather than titles. During the brief period when he did allow the use of titles Brooks was somewhat surprised with the vigor and enthusiasm exhibited by that globe-trotting New Yorker, Congressman Anfuso, who never let anyone forget that he chaired the "Subcommittee on International Cooperation and Security." To Brooks, this was simply "Subcommittee No. 3." Chairman Miller in 1962 assigned Anfuso to chair the Subcommittee on Advanced Research and Technology, and for the rest of the decade the concept of a separate subcommittee on international scientific matters remained dormant. Whatever needed to be handled on an international scale was referred to the Daddario subcommittee.

Fulton, who also served on the Foreign Affairs Committee and was a frequent delegate to international conferences, agitated throughout the 1960's for the establishment of a permanent subcommittee to handle international cooperation. Although a strong internationalist himself, Chairman Miller obdurately resisted all of Fulton's efforts even though the two men annually traveled together as congressional advisers to the U.N. Committee on the Peaceful Uses of Outer Space. Time after time in organization meetings of the committee at the beginning of every Congress, Fulton would trot out his perennial quartet which constituted his wish list: an international subcommittee, an inspector general for NASA, minority staff, and use of boron in launching rockets. Typical of the scene at a committee organization

meeting is what happened on January 30, 1969, at the opening of the 91st Congress:

Chairman MILLER. Mr. Fulton, is there anything you would like to add?

Mr. FULTON. Through several Congresses I have recommended that there be some sort of a committee set up on International Cooperation in Space. There are 70 countries with which the United States now has space relations. We either have NASA installations, university installations, we have treaties on the retrieval and return of the astronauts and on damage. We have the treaty on the banning of the orbiting of nuclear weapons and weapons of mass destruction in space. Likewise, there is the U.N. Committee on the Peaceful Uses of Outer Space that the Chairman and I have been Advisers to for some years.

I feel that we are getting so much into the international field that we are pretty much trying to do it on a United States basis rather than an international approach, so that I think we should emphasize that. Unless we do, it is going to be the military uses of outer space that are going to have the great effect internationally.

Chairman MILLER. With regard to the international aspects of space, we are quite conscious of them. Mr. Fulton, being a member of the Foreign Affairs Committee, is probably doubly conscious of it.

Mr. FULTON. I don't want to lose the jurisdiction.

Chairman MILLER. I don't feel we will lose jurisdiction.

Mr. FULTON. They are setting up a committee this year on Science and Space under a United States Security Subcommittee which, of course, is largely military. Now, we have the peaceful uses of outer space and I think we are just as important as U.S. security inspection.

Chairman MILLER. I am sure of that.

At this point in the proceedings, Chairman Miller launched into a long soliloquy which was his usual custom when he sensed the justice of a case being presented, yet did not want to take any action. His 1969 homily went as follows:

I don't want to bore the old Members and the new Members with a discussion of this at the present time, but I am very happy with what has transpired. I don't know, but I presume this year we will receive invitations for a number of the members of the committee to go to the Air Show in Paris. I want to say this name is a misnomer. This is one of the greatest gatherings of people in the field of astronautics and aeronautics in the world. It takes place in Paris one year and London the next year. Here is where you go to see what is developing. I don't know that we will be able to take the whole committee, but we will try to take as many as want to go. It is a very interesting thing and a place where you do see what is transpiring in the space program.

(Quickly): Mr. Teague?

Mr. TEAGUE. I have nothing, Mr. Chairman.

Chairman MILLER. How about you Mr. Karth?

Mr. KARTH. Nothing, Mr. Chairman.

* * * * *

Whereupon, the subject was quickly dropped without any action.

OVERSIGHT SUBCOMMITTEE AND INTERNATIONAL AFFAIRS—1970

In addition to the international work being carried on by the Daddario subcommittee, Chairman Miller decided to use the Oversight Subcommittee as a mechanism through which to carry out some of the necessary international contacts. It was under this aegis in 1970 that staff members Frank R. Hammill, Jr., and W. H. Boone were sent to Bonn, Germany, in July 1970 to attend a briefing by NASA officials at the European Space Conference—a group of European aerospace manufacturers from different nations. In a formal trip report, as well as personal briefings of the committee on August 6, 1970, Hammill relayed the European apprehensions that plans for the Space Shuttle were "all wrapped up," leaving little room for European participation in the experiments. The report noted that NASA was taking steps to counter these impressions. The discussions in Bonn were the forerunner of many subsequent conferences by the committee with the European Space Research Organization, in preparation for Spacelab—the payload laboratory being planned by ESRO for inclusion on the Space Shuttle. Copies of the observations by Hammill and Boone were immediately forwarded to NASA, receiving this reaction from Frutkin on September 8, 1970:

Both gentlemen have, we think, understood NASA's approach as well as the problems we face on the European side very well indeed. Their travel to Europe was certainly important and constructive in this respect. * * * We are indebted to both Mr. Hammill and Mr. Boone for the care and objectivity of their observations and for allowing us to share them.

Congressman Karth, accompanied by William G. Wells, Jr., of the staff, visited Venice, Geneva, and Madrid in September 1970, primarily to attend a further meeting of "Eurosace" officials discussing cooperation with U.S. post-Apollo plans through the Space Shuttle. Karth warned the European aerospace representatives sharply against being overly optimistic about American assumption of their costs in participating in the experiments to be flown on the Shuttle.

FARNBOROUGH AND PARIS AIR SHOWS

Throughout the 1960's and 1970's, as large groups of Congressmen and staff annually traveled to the Farnborough Air Show in England or the Paris Air Show in France, the committee received some critical correspondence questioning, as one writer did:

As a taxpayer who helps pay your salary and your travel expenses, may I please have an accounting of just what "business" was conducted on this trip?

Executive Director Ducander usually answered all such letters in the following vein:

We are pleased to inform you that the purpose of this trip was to attend the Farnborough Air Show in England and to inspect the Apollo tracking station in Madrid. In addition, a rest stop was made in Dublin, since it was directly on the way to London. For your information, the annual Farnborough Air Show is one of the world's foremost air shows, and since this committee is charged with the overseeing of aeronautical research and development, the Chairman felt that in addition to viewing the many displays, it was important that he meet the representatives of foreign governments who annually attend this show.

BACKGROUND OF INTERNATIONAL SUBCOMMITTEE

Why was an international subcommittee established in 1971? The official version is stated in the committee hearing record:

The chairman of the full committee, Congressman George P. Miller of California, created the Subcommittee on International Cooperation at the beginning of this session of Congress in view of the increasing interest and activity on the international scene in space, and in science generally, and because there appear to be excellent opportunities in the years just ahead for our Nation to enter into more extensive cooperative ventures in many of these fields.

Certainly there is strong factual support for the above statement in the nature of developments at the time. Perhaps an additional clue is contained in the following private memorandum from Executive Director Ducander to Chairman Miller, dated February 24, 1971:

You may remember that I called your attention to a telephone call I had from Mr. Fulton wherein he recommended the appointment of a new Subcommittee on International Cooperation in Space and Science. I think this is a very good recommendation. This has many advantages. For example, one of the hot new things around the Congress these days seems to be international cooperation. You will recall we sent Boone and Hammill to Europe to attend conferences on this matter. It looks like we are making a little progress with the Soviets. Fulton was strong behind you in the organizational meeting yesterday, let's don't forget that. I think we could do well by having a small subcommittee on this subject, and I haven't mentioned the clincher.

Don Fuqua is one of the up and coming new Members of the House, as I am sure you know better than I. He is a worker, has been in your corner on every vote that I can recall in the committee, and I think there should be some way to reward him.

Although the subject matter handled by the subcommittee was fairly important, the subcommittee was viewed among members as being low on the committee totem pole. No member served for more than two years as its chairman, since they were all interested in moving up to better things. Furthermore, between 1971 and 1978 there were two title changes: in 1975, the subcommittee was called "Subcommittee on Domestic and International Scientific Planning and Analysis", the change coinciding with the expanded jurisdiction of the full committee; then in 1977, the phrase "and Cooperation" was added to

the title. An indication of the heavy turnover in this subcommittee chairmanship can be ascertained from the following table:

1971	-Don Fuqua
1972	James W. Symington
1973-74	-Richard T. Hanna
1975	January-March Robert A. Roe
1975-76	March (1975) through December (1976) Ray Thornton
1977-78	James H. Scheuer

Six chairmen in seven years set a record for turnover among subcommittee chairmen of the Science Committee.

The charter members of the new Subcommittee on International Cooperation in Science and Space were as follows:

Democrats

Don Fuqua, Florida, *Chairman*
 John W. Davis, Georgia
 Robert A. Roe, New Jersey
 William R. Cotter, Connecticut
 Mendel J. Davis, South Carolina

Republicans

James G. Fulton, Pennsylvania
 Charles A. Mosher, Ohio
 Alphonzo Bell, California
 Larry Winn, Jr., Kansas

STATUS OF INTERNATIONAL COOPERATION—1971

Following a brief organization meeting of his new subcommittee on May 12, 1971, Chairman Fuqua began a series of three days of public hearings to review the status of the rapidly expanding international cooperative efforts in space and science, and to assess the prospects for the future. Old reliables like Herman Pollack of the State Department and Arnold W. Frutkin of NASA were joined later by Thomas B. Owen, Assistant Director for National and International Programs at the National Science Foundation; Dr. Edward E. David, Jr., the President's Science Adviser; Dr. Harrison Brown, a regular committee member of the Panel on Science and Technology and Foreign Secretary of the National Academy of Sciences; Dr. John W. Townsend, Jr., Associate Administrator of the National Oceanic and Atmospheric Administration; and Myron B. Kratzer, Assistant General Manager for International Activities at the Atomic Energy Commission.

The subcommittee received reports concerning the launching and operation of the huge geosynchronous communications satellites, weighing over 3,000 pounds and carrying from 3,000 to 9,000 telephone circuits for use by the International Telecommunications Satellite Consortium (Intelsat). Frutkin also described the Helios project a joint undertaking with the Germans to understand the Sun and solar-terrestrial relationships, with additional experiments coordinated with Italy and Australia. NASA also brought the committee up to date on recent space cooperation with the Soviet Union.

The National Science Foundation regaled the committee with the details of eight cooperative science agreements with other countries, including exchange of people, seminars, study of the environment, medicine, and agriculture. The committee was especially interested in the multinational programs which the NSF sponsored in the Arctic and Antarctic, as well as the international decade of ocean exploration and the global atmospheric research program. Congressmen Miller and Davis, who had recently visited the Antarctic, hailed the fashion in which scientists of different nations successfully worked together in that area.

During the Fuqua hearings, Winn expressed to Dr. David some apprehension that other countries "have got their eye on our money":

I attended a week ago Monday in Ann Arbor, Mich., a meeting of representatives of 31 countries and 10 foreign organizations. Practically every conversation we held, and even in the discussions as part of the program and the forums that were held all week, the discussion of funding came up. It seemed to me these other countries were looking to us to furnish the leadership in the international field and the funding.

In response, Dr. David pointed out that our policy was to require other nations to invest in the payloads we help them launch and the technology we supply.

THE CHALLENGE OF YOUTH

Dr. Harrison Brown, after listing the truly remarkable advances in international cooperation in recent years, threw down this challenge to the Fuqua subcommittee:

To a new subcommittee of Congress, the future must be far more interesting than the past. Your fresh capacity to create and to build for that future is unencumbered with the baggage of past mistakes. Let me speculate with you while you are feeling young, vigorous and enthusiastic, for I think the challenge you face is enormous.

After outlining short-hand titles of six areas where science and technology could help solve international problems—war, food, health, material possessions, knowledge, and population, Dr. Brown added:

Having worked with Chairman Miller for many years and knowing his dedication to the cause of international cooperation, I can only say that the scientific community should be equally enthusiastic about the prospects for this group and will, I hope, be prepared, as am I, to offer it assistance and support.

At the appearance of Dr. Townsend of the National Oceanic and Atmospheric Administration, Mosher pushed him to take more aggressive steps toward using satellite sensors for oceanography, as well as the development of Earth resources satellites. Even though in 1971 the committee had no jurisdiction in the nuclear field, the briefing received from the Atomic Energy Commission on recent developments in the peaceful uses of nuclear energy helped round out the committee's data

bank on international cooperation. Chairman Fuqua would up the hearings as follows:

We have had 3 days of productive and fruitful hearings that will go a long way in helping this committee in its infancy to try to make some meaningful contributions in the area of international cooperation in science and space

INTERNATIONAL SCIENCE FOUNDATION

Dr. Epimenides Haidemonakis, president of the International Science Foundation, invited Congressman Fuqua to be the principal speaker at the Foundation's annual conference at Chania, Crete, in August 1971. The invitation included this intriguing note:

In addition to the eight-hour working sessions, you are most cordially invited to participate in the many social activities (including) visiting Minoic sites and Zorba-dancing on the island of Crete. In both cases the stimulating surroundings create lasting international friendships and make policy exchange all the more simple.

During their European trip, Representative and Mrs. Fuqua also visited space and scientific installations in other European countries, and Fuqua told the gathering in Crete:

Since the start of the '60s, NASA has entered into some 250 agreements for international space projects. These have comprised specific undertakings with tangible results; not just written agreements. For example, about a dozen-and-a-half scientific satellites have been built by foreign nations and launched with NASA boosters. Agreements exist for launching a similar number of foreign scientific spacecraft during the next few years. * * *

The United States has participated in more than 600 cooperative scientific rocket soundings from vantage points in all quarters of the world. And more than 250 foreign scientists have been involved in the analysis of lunar samples which have been brought back to Earth by the Apollo astronauts. * * *

NASA began its explosive growth 12 years ago under the impetus of international rivalry. During the past year, negotiations have been held with the Soviet Union which reflect a new and positive attitude on their part toward joint efforts in space.

After his return, Fuqua addressed a reception for the representatives of the Western European Union Committee on Scientific, Technological and Aerospace Questions, held in the main committee room of the Rayburn Building on October 19, 1971. This was a crucial meeting in hammering out further details in the development of the plans for Spacelab, the European-sponsored laboratory to be launched with the Space Shuttle.

CHAIRMAN MILLER AND INTERNATIONAL SCIENCE—1971

Meanwhile, Chairman Miller was not idle in fostering closer relationships with other nations during 1971. In May, Miller was the keynote speaker at the Third International Conference on Space Technology in Rome, and he stayed over for an extra day in the Eternal

City to address the American Club of Rome concerning one of his favorite subjects: The dialogue between scientists and politicians.

Scarcely had he stepped off the plane at Andrews Air Force Base upon his return from Italy, when Miller became busily engaged in arranging for a Joint Colloquium on International Environmental Science, which was sponsored by the House Committee on Science and Astronautics and Senator Warren G. Magnuson's Commerce Committee. Well over 200 environmental experts from throughout the world assembled in the historic Old Supreme Court Chamber in the Capitol for the two-day colloquium, May 25-26, 1971, to assess the proper relationship of man to his natural surroundings. The meeting was a naturally expanded outgrowth of the 1967 one-day House-Senate symposium on a national policy for the environment.

In preparation for the great event, the Environmental Policy Division of the Library of Congress' Congressional Research Service produced a comprehensive "Reader in International Environmental Science," a 160-page compendium, including not only an analysis of the problem but also a dozen or so searching articles such as George F. Kennan's proposal: "To Prevent a World Wasteland," raising the challenge:

Could there, one wonders, be any undertaking better designed to meet these needs, to relieve the great convulsions of anxiety and ingrained hostility that now rack international society, than a major international effort to restore the hope, the beauty and the salubriousness of the natural environment in which man has his being?

Dr. Thomas F. Malone, vice president of the International Council of Scientific Unions, acted as rapporteur for the colloquium, which went a long way toward achieving its stated purpose:

To apprise Members of Congress and other leaders about the status of scientific information as the basis for important environmental decisions that have international and global impact.

HIGH NOON FOR THE ENVIRONMENT

The colloquium served as a worthy prelude to the International Conference on the Human Environment held in Stockholm in 1972. Russell E. Train, Chairman of the U.S. Council on Environmental Quality perceptively noted:

Those of us here on this side of the railing, Mr. Chairman, might notice that the clock over your head stopped at 12 o'clock. How many years ago? One might wonder. But it gives me the opportunity to say that maybe it is trying to tell us something, and that is, it is high noon for the environment.

Peter Walker, the young British Secretary of State for the Environment, with broad and centralized powers, was optimistic:

There is a demand of the younger generation who want to have clean air and clean rivers and clean seas and don't want to lose the inheritance of decades past.

Writing his reflections after the colloquium, one of the most striking conclusions was posed by Dr. Franco Fiorio, scientific counselor of the Italian Embassy in Washington (and later chairman of the U.N. Working Group on Remote Sensing of the Earth by Satellites) in a letter to Chairman Miller. After reviewing the necessity for international action to protect the environment, Dr. Fiorio painted the gloomy results of failure to take such action:

The alternative for the not too distant future might well be a dead "Spaceship Earth" carrying for the eternity the cargo of memories and dreams of an extinct race in its silent voyage throughout the immensity of the Universe.

MEETING OF THE MINISTERS OF SCIENCE, OECD

Chairman Miller, as the congressional adviser to the U.S. delegation, traveled to Paris on October 13-14, 1971, to address the Ministers of Science of all the member countries of the Organization for Economic Cooperation and Development. Dr. Edward E. David, Jr., the President's Science Adviser, headed the U.S. delegation, and Philip B. Yeager of the committee staff accompanied Chairman Miller to the Conference.

At the Conference, Chairman Miller had an opportunity to express his views and those of the Science and Astronautics Committee far more freely and fully than he had at the 1967 OECD "Confrontation Meeting" which he had attended with Dr. Hornig. He furnished examples of the congressional role in the making of science policy, especially the work of the Subcommittee on Science, Research and Development in revising the charter of the National Science Foundation, the recommendations on what U.S. science policy should be, and the development of technology assessment. Information was also furnished on Science Committee findings on the relation between Science, Technology, and the Economy. In Chairman Miller's report to the committee and to the Congress after his return, he stressed the meaning of the meeting to the United States:

First, there is a change of emphasis in the way science and technology will be used in the future * * * (with) concentration on the applications of technology to the kind of social needs and life-quality standards which the OECD nations have in common and to which they have proclaimed their dedication. * * *

Second, more international movement and involvement seem unavoidable. * * *

Third, in situations such as these, it would appear that the United States has little choice but to participate in this worldwide economic ballgame.

A NEW CHAIRMAN: JIM SYMINGTON—1972

As 1971 drew to a close, Chairman Miller could look back with some pride on the committee record on international cooperation, a

large part of which he had contributed himself through what can only be described as herculean transoceanic efforts. On December 7, he sat down for one of his relaxing morning conversations with Executive Director Ducander. With the death of Fulton and the departure of Karth to the Ways and Means Committee, plus the elevation of Downing as chairman of the Space Science and Applications Subcommittee, this left a vacancy in the Subcommittee on NASA Oversight which Downing had chaired. The game of musical chairs began, as Miller figured that seniority entitled Fuqua to move up from his post as chairman of the Subcommittee on International Cooperation in Science and Space to take over the Oversight Subcommittee.

Chairman Miller, who had fought for so many years against Fulton's repeated efforts to establish an International Subcommittee, now realized its tremendous value and he was very anxious to insure that the new subcommittee chairman would be able to emulate Fuqua's good start in 1971.



Representative Earle Cabell (Democrat of Texas), left, inspecting Orbiting Geophysical Laboratory facilities at NASA's Goddard Space Flight Center.

Going down the committee list, Miller and Ducander talked out the big problem they faced. Although Symington ranked next to Fuqua on the International Subcommittee, Representative Earle Cabell ranked ahead of Symington in full committee seniority. Cabell, who

had been mayor of Dallas at the time of President Kennedy's assassination in 1963, was a likeable team player who served on Teague's Manned Space Flight Subcommittee as well as the Science, Research and Development Subcommittee. Miller realized that Symington, former Chief of Protocol at the White House, fluent in French, and every inch an internationalist—even to the extent of worrying about the international implications of letting Congress order the President to place the American flag and none other on the Moon—was the logical choice to succeed Fuqua.

On December 8, 1971, "Duke" lined up the pieces of the jigsaw puzzle and wrote this memorandum to Chairman Miller:

You asked that I submit a memorandum on the Subcommittee appointments. Enclosed herewith is a list of subcommittees with the recommended changes pencilled in. These recommendations are in accordance with our conversation of yesterday morning. Naturally, I have done nothing on the Republican side, and as soon as you have made your decisions we can send them to Mr. Mosher for his selections. Keep in mind that the Committee is two members short, one majority member to replace Mr. Karth and one minority member to replace Mr. Fulton. I imagine these assignments will be made after the second session convenes.

Please remember that in order to place Mr. Symington in seniority for the chairmanship of the Subcommittee on International Cooperation in Science and Space you will have to pass over Mr. Cabell. You said you would talk to him about this, since he is one of our best Members in attendance and Committee work and I am sure you would agree that we would not want him offended in any way. Also, I think you will want to talk to Mr. Fuqua since he is being changed from the International Cooperation Subcommittee up to the NASA Oversight. You will remember I told you yesterday that he got the impression he was being appointed to a new Subcommittee on Applications, which I think you agreed was not necessary inasmuch as they would have only one line item to consider and both Space Science and Applications have been handled by one subcommittee with no difficulty.

Please let me know when you have made your decisions on this matter and I will have the new appointments typed up so that they can be sent to Mr. Mosher in order for him to make his selections.

Symington was an extremely busy man in January 1972, preparing for and shouldering the big responsibility of moderating the Panel on Science and Technology devoted to his favorite subject: Earth resources. So when Chairman Miller got some of the top-ranking committee members together to announce his decisions—which was the way things were done in those days—Symington had a conflict, and couldn't make it. This prompted Ducander to write Symington a note stating:

It has occurred to me that you were not present on Tuesday morning when the Chairman met with Ranking Members of the committee and perhaps have not been informed that at that time he appointed you as Chairman of the Subcommittee on International Cooperation in Science and Space.

Mr. Frank Hammill is the staff member assigned to this Subcommittee and is available to give you such assistance as you may require. If you need additional help from the staff, please let me know.

THE LAUSANNE CONFERENCE 1972

When Chairman Miller was taking part in the Ministers of Science meeting of the OECD in Paris in November 1971, Senator J. de Grauw, chairman of the Ministers' Committee on Science and Technology, asked him personally to come to Lausanne, Switzerland, in April 1972. The invitation was followed up with many written pleas for Miller to speak at and participate in the Third Parliamentary and Scientific Conference of the Council of Europe. In January 1972, J. D. Priestman, clerk of the Assembly of the Council of Europe, once again appealed to Chairman Miller:

Your presence at the Conference would be a welcome confirmation of the cooperation initiated between our respective Science Committees in the spring of 1968 with the informal exchange of views at Strasbourg and our own participation at your Panel on Science and Technology in 1969.

It was a tough decision for Miller to make. He looked at the calendar and saw that the Democratic primary in California would be coming two months after the Lausanne meeting, a primary which proved to be his own Waterloo. He agonized over the decision, because he was supremely confident that despite the fact he was 80 years of age the voters of the East Bay area would surely follow the habit they had since 1944 and send him back for another term. Finally, on March 3, he wrote Priestman:

Unfortunately, my schedule will not permit me to be present. However, I am designating Honorable James W. Symington, a Member of this Committee, to attend in my place. Mr. Symington is Chairman of our Subcommittee on International Cooperation in Science and Space and is a former Chief of Protocol of the United States Government. He is uniquely qualified to represent me at this important conference.

For Symington, this meant that his subcommittee which he had just inherited would have to wait before launching any substantive hearings in depth. But Lausanne gave him a challenging opportunity to display his unusual talents as a leader, mixer, and international consensus former. His fluency in French, the language of the Conference, served him in good stead, and time after time he advanced "proposals which were incorporated in the final conclusions of the Conference," according to H. C. Christensen writing from Strasbourg. Christensen, secretary of the Committee on Science and Technology of the Council of Europe, wrote an enthusiastic letter to Chairman Miller on April 28:

Mr. Symington's active participation and stimulating interventions in the discussion was highly valued by all participants.

COOPERATIVE AGREEMENTS WITH THE SOVIET UNION 1972

The Symington subcommittee got off to a careful start, with briefings by the State Department and a visit to the United Nations to size up what was being done by the various U.N.-affiliated organizations involved in science and technology matters. In mid-June, Symington called public hearings on four cooperative agreements which President Nixon and Kosygin had signed in Moscow, dealing with space, medicine, science and technology, and the environment. Mosher, as the ranking Republican on the full committee, and Frey, as the ranking Republican on the subcommittee, strongly supported the hearings and actively participated in the comments and questioning of witnesses. In 1972, the Subcommittee on International Cooperation in Science and Space included the following members:

Democrats

James W. Symington, Missouri, *Chairman*
 Robert A. Roe, New Jersey
 William R. Cotter, Connecticut
 Morgan F. Murphy, Illinois
 Mendel J. Davis, South Carolina

Republicans

Louis Frey, Jr., Florida
 Alphonzo Bell, California
 Larry Winn, Jr., Kansas
 Robert Price, Texas
 Barry M. Goldwater, Jr., California

On the opening day of the hearings, Symington observed:

Surely, the deeper significance of these agreements lies in the promise they hold for the reduction of tensions between the two signatories. It is difficult to shake hands and fists at the same time.

The President's Science Adviser, Dr. Edward E. David, Jr., praised the initiative of the Symington subcommittee in holding the hearings:

I would like to thank you and your committee for your interest in these four agreements. I think in order for them to achieve their potential for this country, it will take the support not only of the public but of the Congress. Your immediate interest in this whole area, and our ability to put our views on the record at an early stage, and to solicit your support and the support of the American people through these hearings is most welcome from our viewpoint.

Dr. Philip Handler, President of the National Academy of Sciences, traced the changing spirit of scientific relationships between the United States and U.S.S.R. from the 1960's to the 1970's. He labeled the early, modest, limited exchange visits as "the icebreaker." Then he warned the Symington subcommittee that if cooperation were to flourish, there must be a relaxation of the rigid "off limits" rules in both countries. He noted that travelers from either country suffered from reciprocal countermeasures. He warned that:

If the level of exchange is to be expanded significantly, this nonsense must cease on both sides.

Mosher added to the balance of the hearings by pointedly remarking that the impression had been circulated that the United

States had been pressing for cooperative agreements while the Soviet Union always had a monolithic resistance. Mosher observed:

I suggest probably for accuracy's sake our record should show that this isn't so; that there actually was considerable disagreement and suspicion, fully as much over here, as we approached the summit

The Symington hearings achieved their purpose as a good sounding board for the nature of the cooperative agreements and their meaning as a possible step toward better understanding.

RICHARD T. HANNA—1973-74

The third in the fast-changing series of chairmen of the International Subcommittee was Representative Richard T. Hanna of Anaheim, who represented California's conservative Orange County and parts of Los Angeles County. Unfortunately, Congressman Hanna will be better remembered as the central congressional figure in the "Koreagate" scandal, for which he served time in Federal prison. His reputation in the Congress was that of a very likable, hard-working, stimulating conversationalist, who could be counted on to spice floor debates with interesting and telling anecdotes to make his points. A liberal Democrat in a strongly conservative district, Hanna survived a series of squeaky victories through adroit use of the power of incumbency.

Born in Kemmerer, Wyo., he moved with his Mormon family to Long Beach, Calif. in 1923. Hanna graduated from UCLA Law School, and practiced law briefly before winning a special election to the California Assembly in 1956, and then went on to win his first election to the House of Representatives in 1962. He was one of the first modern day Congressmen to grow an Ernest Hemingway beard.

When Teague moved up to the chairmanship of the full committee in 1973 and Symington advanced from the International Subcommittee to take over Space Science and Applications, Hanna was next in the seniority line and without too much fanfare he inherited the International Subcommittee. In the committee's organization meeting on February 28, 1973, Hanna had this brief exchange with Chairman Teague:

Mr. HANNA. Isn't it true that the Chair is inclined to be moving ahead with those subcommittees which have authorization legislation upon which our appropriations are predicated as taking priority over the other meetings?

Chairman TEAGUE. That is true.

So Hanna bided his time until the NASA, NSF, and other authorizing legislation wended its laborious way through the hearings process.

On March 13, 1973, Hanna addressed a luncheon meeting in Washington of the American Institute of Aeronautics and Astronautics. In the course of his remarks, he stated:

Put in its simplest terms, we in the Congress have right along been interested in the development of programs for sharing both the costs and the benefits of space research and application on an international scale.

Not long after the luncheon, the AIAA informed Hanna that the Soviet Committee for Science and Technology had asked the AIAA to co-sponsor an aeronautical technology symposium in Moscow in July. Hanna felt this would also be a useful opportunity to visit with Soviet officials and inspect installations, as well as accepting an invitation from Japanese scientific leaders.

On June 5, 1973, he called an organization meeting of his subcommittee which included the following members:

<i>Democrats</i>	<i>Republicans</i>
Richard T. Hanna, California, <i>Chairman</i>	Louis Frey, Jr., Florida
James W. Symington, Missouri	Alphonzo Bell, California
Robert A. Roe, New Jersey	Larry Winn, Jr., Kansas
Mike McCormack, Washington	John N. Happy Camp, Oklahoma
Dale Milford, Texas	

After discussing the proposed trip to Russia and Japan at the end of July, Chairman Hanna told the organization meeting of his subcommittee:

This Subcommittee has the possibility of some very interesting work in several different roles. * * * I think this Committee is coming on the scene with a role to play at a most important time in the history of the United States. If I read the cards right, for the next 20 years the single most important thing pressing the United States is going to be to expand international trade. You need only to be aware of this energy crisis and how much of the import distortions are going to come because of our bringing in petroleum to realize that we are going to be really hard pressed to have a balance of payments unless we have a more dynamic trade posture.

The other place where I think there is a very interesting development is in the use of space, for instance, the ERTS program and the international communications satellites program.

Hanna, Roe, Milford, Gunter, Winn, and Camp, accompanied by staff members Frank R. Hammill, Jr. (majority) and Joseph Del Riego (minority) made their way to Dulles Airport Friday afternoon, July 20, whence they took off for Moscow. Hanna was optimistic about the trip. He had carefully laid the groundwork through Ambassador Dobrynin. At a press conference prior to his departure, Hanna expansively predicted: "I have called this press conference to announce what I feel is potentially one of the most important breakthroughs in U.S.-U.S.S.R. relations in the last 25 years."

Chairman Hanna took his delegation to Star City, the Soviet cosmonaut training center, which proved somewhat of a surprise to Chairman Teague, who along with Congressman Winn had been denied a chance to visit Star City in a trip to Russia in August 1972. The subcommittee also met with academician Boris N. Petrov, chairman of Interkosmos of the U.S.S.R. Academy of Sciences and a central figure in the projected Apollo-Soyuz joint United States-Soviet manned flight in 1975. At Star City, they met with three Soviet cosmonauts who had already flown missions in space, including Lt. Col. Alexei A. Leonov, designated the Soviet commander for the Apollo-Soyuz mission. Chairman Hanna reported:

Ours was the first congressional delegation to visit Star City. We were treated very hospitably; we were shown their Cosmonaut training equipment and facilities, and we felt our questions were fully answered. We were impressed by the open and congenial attitude of our hosts.

The delegation also took time in both the Soviet Union and Japan to visit and discuss various energy projects, including a visit to the magnetohydrodynamics (MHD) pilot plant on Moscow's outskirts. In Japan, in addition to meeting with the Space Activities Commission, members of the Japanese Diet, and responsible international trade officials, the Hanna subcommittee spent considerable time going over future Japanese plans in the areas of solar and geothermal energy.

U.S.-U.S.S.R. ADVANCED TECHNOLOGY TRANSFER

On December 4, 5, and 6, 1973, Chairman Hanna's subcommittee held hearings on the transfer of advanced technology between the United States and Soviet Union. Witnesses from government, industry, and the academic world up-dated the committee on Soviet-American trade, with special emphasis on technology. This included the building of manufacturing plants in the Soviet Union by American firms, as well as cooperative research and development agreements. To many of the committee members, the hearings brought out more minuses than plusses in the nature of American-Soviet technology transfer, perhaps symbolized by the remark of Dr. Marshall I. Goldman of Wellesley College to the committee.

When Party Secretary Brezhnev left the United States, he and President Nixon exchanged gifts. The Russian was given a rifle and a Lincoln Continental. The American ended up with a silver samovar and a tea set. This one-sided exchange, reminiscent of the wheat deal, seems to symbolize most United States-Soviet trade transactions so far.

In the three days of hearings, the committee aired many other difficulties and pitfalls involved in the technology transfer process, including the whole area of patent policies, the extent to which tech-

nology transfer helped build Russian military strength, and the effect on American jobs. Congressman Roe in particular expressed concern at the lack of any central policy toward technology transfer and observed:

We are truly in the midst of World War III right now. It is an economic war as to which society and economic system can prevail.

TECHNOLOGY TRANSFER TO UNDERDEVELOPED NATIONS

Perhaps because of the wide divergencies of opinion on the subcommittee, no report was issued on the hearings. But the following year, the Hanna subcommittee in its final public effort held three days of public hearings on a bill introduced by Congressman Hanna, H.R. 14242, entitled the "International Science and Technology Transfer Act of 1974." At hearings held May 21-23, Chairman Hanna called witnesses to comment on his legislation, whose aim was to establish an institute under the National Science Foundation to facilitate the transfer of American inventions and research developments in science and technology to underdeveloped nations. The bill was carefully tailored to insure its referral to the Science and Astronautics Committee and Hanna's subcommittee.

When NSF Director Dr. Guyford Stever in his best diplomatic manner praised the intent but not the content of Hanna's bill, it promoted Winn to remark:

I do get sort of a lukewarm feeling from your testimony this morning.

Hanna himself had to concede:

Mr. Winn, I think we will detect the chill winds from OMB blowing across this legislation.

As the three days of hearings drew to a close, Winn remarked he would compare the whole problem brought out by the hearings to the following analogy:

One can compare it with throwing a football to a group of less-developed country kids who have never seen a football game. They do not know whether you kick it, eat it, sit on it; I think we may be doing that and thinking we are helping these less-developed countries.

Without attempting to summarize the hearings, Chairman Hanna, at 11:25 a.m. on May 23, 1974, delivered his final pronouncement as a member of the Science and Astronautics Committee:

Unless there is some other matter to be disposed of, the committee will be adjourned.

BRUSSELS CONFERENCE ON SATELLITE TRANSMISSIONS

Speaker Albert designated Chairman Teague as a congressional adviser to the U.S. delegation attending the Brussels Conference in

May 1974. The Conference was officially known as the "International Conference of States on the Distribution of Program-Carrying Signals Transmitted by Satellite." The Conference was called to draft an international agreement to protect the rights of broadcasters, performers, and copyright owners in television transmission via satellite. Fifteen participating nations signed the agreement.

On June 20, Chairman Teague arranged for Harvey J. Winter, Director of the Office of Business Practices at the State Department and Ms. Barbara Ringer, Register of Copyrights at the Library of Congress, who led the U.S. delegation, to brief the committee on the conclusions. The Treaty was best summarized in the following provision:

Each contracting state undertakes to take adequate measures to prevent the distribution on or from its territory of any program-carrying signals by any distributor for whom the signal emitted to or passing through the satellite is not intended.

The trip to Western Europe enabled Chairman Teague to visit the European Space Research and Technology Centre in the Netherlands, and to be brought up to date on the work being done on "Spacelab" for inclusion as a payload on the Space Shuttle.

APOLLO-SOYUZ

It was election time in 1970. Almost all committee members were in their districts as October drew to a close. Having won his Democratic primary in June, Chairman Miller was safe again for two years. He could afford to be expansive and relaxed when NASA's Acting Administrator, George M. Low, called him on the telephone to advise him that there had been a big breakthrough in the discussions in Moscow between NASA and the Soviet Academy of Sciences. Chairman Miller advised Low to follow up with a letter with further details.

On November 2, 1970, Low advised Miller:

Since compatible docking arrangements could open the way to a wide variety of possible future activities in space, we believe that this is a matter of considerable importance. The technical discussions, which took place October 26-28, resulted in an agreement on procedure and a schedule for joint efforts to develop designs for compatible rendezvous and docking arrangements. * * * The Soviet representatives were direct, open and clearly intent on reaching positive results.

When Thomas O. Paine had been NASA Administrator, he initiated with Soviet officials, including M. V. Keldysh, President of the Soviet Academy of Sciences, the negotiations which eventually led to agreement and the Apollo-Soyuz flight in 1975. From the start, committee members were deeply split on the issue. Teague, who had reacted sharply against President Kennedy's U.N. address in September



NASA Administrator Thomas O. Paine (right) swears in Dr. George M. Low as Deputy Administrator in 1969.

1963, suggesting a joint American-Russian manned flight to the Moon, remained skeptical, pessimistic, and generally negative until just before the flight. Miller, who generally went along with what NASA wanted, was supportive. On November 13, 1970, most committee members were off resting after the strenuous rigors of another election campaign. On that date, Chairman Miller dispatched to all members of the committee a copy of Low's November 2 letter, with a covering memorandum indicating that the American-Soviet talks had been "highly successful," that "the agreements reached to date could conceivably pave the way for broader and more significant U.S., U.S.S.R. cooperation," and concluded with this:

I have asked Dr. Low to keep this committee fully and currently informed on the progress being made in this important endeavor. There is attached for your information his initial report in this regard.

KEEPING THE COMMITTEE MEMBERS INFORMED

In the closing weeks of 1970, Chairman Miller literally peppered all members of the committee with document after document to bring them up to date on the finest details of the negotiations. For example,

on November 16, 1970, a memorandum from Miller to all committee members read:

Section 102(c)(7) of the National Aeronautics and Space Act of 1958 prescribes as an objective international cooperation in the peaceful application of the results of our space effort.

The committee has actively pursued this matter and maintains constant surveillance over NASA's implementation of the above provision. Periodic staff conferences with NASA officials are held and NASA is required to keep the committee fully and currently informed.

In addition to the major agreement with the Soviet Union concerning compatible rendezvous and docking arrangements, NASA, on behalf of the United States, has consummated agreements this year with many other nations. There is attached for your information a NASA report to the committee outlining agreements reached this year. More detailed information is available in the committee files.

Thus, although there was a great deal of opposition to the trend of the agreements, Chairman Miller got the jump on his committee members by deluging them with so much information that they had to confess they had come in after the movie had started, and thus their criticisms were slightly dulled. At first, discussions were confined to compatible rendezvous and docking mechanisms or perhaps a joint visit to Skylab or the Russian space station Salyut. But when Low went to Moscow in January 1971, his discussions with Keldysh advanced to a more specific talk on the use of existing Apollo and Soyuz spacecraft for a linkup.

On January 26, 1971, for the first time in the history of the Science Committee, a representative of the Soviet Union testified before the committee. Dr. Viktor A. Ambartsumian, president of the Academy of Sciences of the Armenian S.S.R., Yerevan, U.S.S.R., delivered a paper before the Panel on Science and Technology which was mainly devoted to scientific cooperation. He slipped in a sentence which nobody noticed:

I was impressed by today's report by Doctor Low about the possibilities of cooperative work in space between Soviet and American scientists.

What he was referring to was Low's address before the National Space Club, reviewing his recent successful trip to Moscow.

It is interesting that Dr. Low, in his initial presentations as Acting NASA Administrator before the full committee in March 1971, played down Apollo-Soyuz. The roseate glow of success of Apollo 14 was still fresh on everyone's mind, and Alan Shepard and his fellow astronauts appeared in person to tell of their recent feat. Dr. Wernher von Braun once again dazzled the committee with his clear view of the future. But precious little detail was given, other than the almost casual closing statement by Dr. Low:

Recently the Soviets have, for the first time, been willing to discuss with us, seriously and openly, the possibilities for meaningful cooperation in space. I will

provide a statement on these developments for the record. I firmly believe that we can cooperate with the Soviets in the areas we have under discussion without prejudicing any of our vital national interests.

Obviously, NASA did not want to get into an imbroglio before the committee until the delicate negotiations had proceeded a little farther. Only Symington raised the issue and received a rather low-key response from Dr. Low as to the state of the negotiations with the Soviet Union.

Arnold W. Frutkin, NASA's Assistant Administrator for International Affairs, finally bit the bullet and gave the Subcommittee on International Cooperation, on May 18, 1971, a comprehensive review of the progress of negotiations with the Soviet Union. His reception before the Fuqua subcommittee was friendly and cooperative. Only Congressman Murphy expressed a generally negative reaction, that perhaps we were "giving and not getting anything in return."

PROGRESS OF NEGOTIATIONS—1972

On June 30, 1971, following the deaths of three Russian cosmonauts upon their return from space, Miller and Fulton piloted through the House a resolution of sympathy "to their wives, families and to the Russian people." Fulton in addressing the House on the resolution, praised the cooperative effort toward "working out joint docking procedures." On March 2, 1972, Christopher C. Kraft, Jr. gave the Manned Space Flight Subcommittee an extended account of the progress of Apollo-Soyuz negotiations. Fuqua asked Kraft:

Are our astronauts going to have to be fluent in Russian or will the Russians be fluent in English? How will we solve the problem of communicating, so each one understands the other?

Kraft sidestepped the question by pointing out that when the Houston group had visited Moscow, they studied Russian, but soon discovered that the only people who could understand their version of Russian were the people from Houston; hence they labeled this new language "Rouston."

Representative Robert Price (Republican of Texas) was the most outspoken opponent of the joint mission. "I would rather not dock with them at all, as far as I am concerned," he bluntly remarked during a hearing of the Manned Space Flight Subcommittee. Teague was equally blunt in private. He called a subcommittee meeting for May 31, 1972, at which NASA officials laid out the entire history of the negotiations and also answered questions from members of the full committee. Teague bombarded NASA witnesses with a barrage of questions:

Who is in command? Suppose you have to do something quickly and you have to make a decision quickly. Who is in command? You can't have two bosses when you get into a situation like that.

NASA answered: "So far we have agreed that each country would have control of its own spacecraft and crew."

Teague asked:

What about communications? Do you envision having to use a lot of interpreters? Or are you going to have all the astronauts studying Russian?

OPPOSITION TO APOLLO-SOYUZ

There were many unanswered questions. Yet publicly at least, the criticism seemed somewhat muted. Not so a month later when Symington's International Subcommittee received a briefing on Apollo-Soyuz. Price cut loose at Dr. Low:

It is my conclusion that they have not ever lived up to any agreement they have ever made in history. And I think as long as they can they will use us to develop their equipment in every way they can, and then they will abandon us when the time comes. This idea of compatibility is a wonderful thing, and peace, all this sort of thing. But I don't think we want to rush headlong into this thing blindly, not knowing that they technically will bleed us of everything they can bleed us of.

A different point of view was expressed by Hechler:

As a student of history, I can't help but be gripped by the historic significance of what is being described. It is a few months less than 15 years ago when the Russians launched Sputnik, and that sent shock waves not only throughout the American scientific community, but it shook Congress and the Nation to its foundations. * * * It is significant that we are not arguing emotionally over "whether," but we are talking about "how." That to me is a great breakthrough for the world.

THE TEAGUE-WINN TRIP TO RUSSIA 1972

In August 1972, Teague and Winn took a trip to the Soviet Union. They asked to see Star City, the cosmonaut training center, and some of the tracking stations in the Soviet Union and were told "Nyet." Teague acknowledges:

It wasn't quite fair how we did it. We went over without telling a soul. I am sure if we had gone through the right channels, we would have been shown everything. They didn't show us a damned thing. * * * I got more than a cool reception.

Space Subcommittee staff director, Jim Wilson, who accompanied Teague and Winn to Moscow and made the advance arrangements, indicates that if Ambassador Dobrynin had been in Washington at the time, he is sure that the Soviets would have arranged to show the committee members almost everything they wanted to see. As it turned out, the Russians, who require an incredible amount of time to get their slow-moving bureaucratic machinery geared up, simply remained clammed up. They did make a few more personal concessions, however. Teague was greeted by one of the chief scientists of the Soviet Union, a robust character who looked like the type who had worked in a potato field or a coal mine, and who spoke perfect English in addressing Teague:

We have something in common. We are both from the South. I'm from Georgia.

Teague relates:

They also showed us a museum which I thought was really good.

Ambassador Dobrynin was understandably upset when he learned about the gaffe. He called on Teague and according to Teague:

Ambassador Dobrynin wanted me to go back over there and they wanted to show me around --really show me around.

Returning from his trip, Teague asked his subcommittee staff director, Jim Wilson: "Was the Rendezvous and Docking Program authorized in the * * * NASA Authorization" in 1972? Wilson replied on September 11, 1972, that the direct answer was "No," but NASA had succeeded in reprogramming \$38 million from the Skylab program to start Apollo-Soyuz on its way. Sure enough, a careful review of the records shows that Chairman Miller, on June 27, sent a duplicated memorandum to "All Committee Members" indicating that NASA planned to reprogram funds for this purpose. The very same day, June 27, Miller dispatched a letter to NASA Administrator Fletcher, stating:

The committee interposes no objection to your proceeding with the proposed program adjustments.

TEAGUE OPPOSITION TO APOLLO-SOYUZ

The Houston Chronicle carried a front-page article on January 7, 1973, with a 3-column headline: "Drop U.S.-Russ Space Flight, Says Teague." In the article, based on an interview with Teague, it was pointed out that President Nixon's Office of Management and Budget was holding NASA to a total expenditure of about \$300 million less than 1972. Teague then told the Houston interviewer:

This cooperative effort we are trying to make with the Russians, which I have considerable doubt about, runs about \$300 million. Whether it is better used that way, I am yet to be convinced. We are going to look very carefully at this. It's strictly a political, psychological effort and maybe it's great, but we are sure going to hold some careful hearings on it.

His mail seemed to support Teague.

"Put a stop to this ridiculous effort," wrote a man from Muncie, Ind. "If they were trustworthy it would be OK, but why should we divulge any more information to them than what they already know about our efforts?"

A Houston, Tex. man wrote Teague:

I find it intriguing they would disallow your entry to their so-called vast technological complexes. If, indeed, they did bar you from any on-site inspection this only confirms the deep suspicion that the Russians are about as capable of equally sharing in any space program, or contributing something to our space efforts, as I have of being elected to be the next President of the United States

[The writer's name was not Carter.]

But a lady from McLean, Va., warned:

God help us if we are found by another intelligent species, and are unprepared to meet them!

Answering both the favorable and unfavorable letters, Teague made this comment:

During August 1972, I visited the Soviet Union and the Soviet Academy of Sciences. Based on that trip, and my discussions with senior officials of the Academy of Sciences, I have strong reservations as to the sincerity of the Soviets in this program.



(Chairman Teague and Apollo Astronaut (now Lieutenant General) Thomas P. Stafford.

ASTRONAUT STAFFORD MODERATES TEAGUE'S OPPOSITION

One of the moderating influences on Teague was Air Force astronaut Thomas P. Stafford, for whom Teague had tremendous respect. Having been designated in January 1973, as commander of the U.S. crew on the proposed mission, Stafford was in a strong position to brief Teague privately on how the plans were developing and what were the real intentions of the Russians toward the mission. Teague consistently took the position that the flight should be long enough, and loaded with sufficient U.S. scientific experiments so that "if the Russians at the last minute said they were not going, we would have enough experiments on that shot to make it worthwhile."

On March 7, 1973, Winn began to display a softening of his opposition to Apollo-Soyuz. During questioning of Chester M. Lee, NASA's Program Director of Apollo-Soyuz, Winn remarked:

I think both Chairman Teague and I are proceeding with caution on some things because we are of the opinion that it may be a one-sided deal where they are basically picking our brains but the more of the hearings I read and also some of the earlier comments by Dale Myers, I am beginning to alter my thinking in that field. I think maybe we are benefiting in more ways than I thought we were going to.

Fuqua's questioning in 1973 brought out the fact that \$250 million would be the top figure for the project. In addition, most of his questions and observations were favorable. On the other hand, Representative Bill Gunter (Democrat of Florida) was still skeptical. His attitude can be summed up in his question:

Isn't it true the ultimate end of cooperation, and I'm not against cooperation, Mr. Chairman, is that if we are yards ahead of them, they and their technology are going to benefit more than we?

On May 1, Teague wrote to NASA Administrator, Dr. Fletcher:

As the Apollo-Soyuz Test Project is currently constituted serious questions exist as to the value of the American portion of the program if a rendezvous with the Soviet spacecraft is not accomplished for any reason.

Since failure to rendezvous for either political or technical reasons is a possibility, it is essential that the NASA portion of the mission be capable of making a justifiable, independent, scientific and technological contribution without reliance on a Soviet rendezvous.

Please advise me as to what steps can be taken by NASA to assure that this objective is obtained.

Dr. Fletcher replied candidly on May 17 that "I share your concern." He noted that NASA was reviewing a number of proposed experiments, but "I do not believe at this time that these experiments could justify a U.S.-only mission." He indicated that "as a result of your inquiry, we are currently studying alternatives that might provide the capability to carry experiments whose scientific and technological return would justify such a U.S.-only mission." But it was also clear

from the conclusions of NASA that they fully expected the Soviet Union to go ahead with the mission, a conclusion which Teague eventually reached himself.

STABILIZING FACTORS

By 1973, NASA no longer had Chairman Miller on whom they could depend for instant support. They now had to cope with a new chairman who was basically sympathetic, but who also wanted answers to questions which Congress and the people were asking before he would pledge his support. There were further stabilizing factors: Fuqua, as the new chairman of the Manned Space Flight Subcommittee was equally determined to get on with the program and at the same time get all the questions resolved; former Apollo 13 astronaut Jack Swigert, the new executive director of the committee, proved very effective in advising Chairman Teague on personalized details concerning manned space flight as well as resolving the basic doubts which Teague himself had.

On September 12, 1973, Fuqua asked Dale Myers, NASA's Associate Administrator for Manned Space Flight, to supply answers to about 20 questions concerning what now began to be called "ASTP" (Apollo-Soyuz Test Project). His letter to Myers stated:

After discussing the ASTP program with Chairman Teague, we feel it is important to review not only the current status of the program, but also more particularly the experimental program which is planned for the flight. In a previous letter to Dr. Fletcher, Chairman Teague has expressed his concern that the experiments carried should be able to justify this mission on its own in the event a rendezvous and docking is not possible for any reason. In that regard, I would hope that you would be prepared to review in depth how this might be accomplished.

An executive session of the Manned Space Flight Subcommittee was scheduled for October 2, and for the briefing NASA sent Dr. George M. Low, Program Director (Navy captain) Chester Lee, plus astronaut Gene Cernan, recently named as ASTP Assistant Project Technical Director.

During the briefing, Wydler and Gunter both raised questions about the extent of cooperation with the Russians:

MR. WYDLER. Mr. Chairman, if I could just ask you to try to get some perspective on this problem you are having of getting the Soviet Union to cooperate. If you were to say full cooperation would be a hundred percent, what percentage of cooperation do you feel that you are getting?

CAPTAIN LEE. That is pretty hard to quantify.

MR. WYDLER. 99 percent? 50 percent? Some kind of a general

CAPTAIN LEE. In the 90's.

SAFETY AND MONEY LIMITATIONS

In response to questions by Mosher, NASA emphasized that considerations of safety and limitations of money made it difficult to stage many additional experiments. Winn then raised this question:

If for some political reason that we don't have the joint docking, what do we tell the American people we are going to do?

But Low was confident:

We don't expect it to happen. * * * If we are on the pad and ready to launch in July of 1975, and then for some reason the Russian portion of the mission is cancelled * * * I think we would want to discuss this with the Congress and within the Executive Department before we decided to fly.

Teague was still disturbed:

It seems to me unbelievable we would plan this flight and not have an alternate plan.

Dr. Low then suggested:

The alternate plan first of all is to fly the experiments only. * * * The second alternative is to go back and revisit Skylab.

Swigert returned to the text of Teague's May 1 letter to Dr. Fletcher:

If I read the Chairman's letter, would the 18 experiments justify the cost of this flight without the rendezvous, can you answer that yes or no?

Dr. Low responded:

I can answer it very clearly. Yes and no. [Laughter.]

Teague was exasperated that NASA contended they had only \$10 million of the \$250 million set aside for experiments on ASTP:

We went along here so damn short of money that we were just crying our eyes out. We couldn't get more. And all of a sudden this proposal comes up. And there sure was some money that came from somewhere to start this project.

And it just seems to me that \$10 million is kind of a drop in the bucket compared to the whole thing.

TEAGUE PRESSES FOR MORE EXPERIMENTS

Teague stuck to his guns. In an October 15, 1973 letter to Dr. Fletcher, he reiterated his stand:

I feel strongly that the American public will not be well served if, because of a restricted experiment budget, the ASTP mission takes place without full utilization of the payload capability available. * * * Within your current budget, the \$250 million for total program with only \$10 million for experiments is certainly small for the experimental portion of the program. I am compelled to believe that within total funding it should be possible to increase the experimental payload to the maximum extent possible.

After a further study, Dr. Fletcher answered on November 19 that "NASA is actively pursuing plans to provide a good scientific payload," that there were "potential substitutes or additions to the ASTP experiment payload," that "major cost savings were brought about by using a rolled aluminum docking module rather than the traditional lightweight aluminum honeycomb" which might be applied to additional experiments.

Although appreciative of NASA's efforts, Teague answered on December 5:

However, I still feel that the American public—to say nothing of Congressional attitude—will be best served in the end if, in addition to these observations, the maximum vehicle payload is utilized with experiments. *** My first communication on the subject of additional experiments occurred six months ago. Hearings have since been held and subsequent communications, both written and verbal, have been exchanged. Little change has taken place, it seems to me.

As a followup, Swigert visited the Johnson Space Center in Houston just after Christmas 1973, in an attempt to persuade the ASTP Project Director to incorporate additional experiments.

MORE MONEY FOR EXPERIMENTS

Gradually, the influence of the committee feeling began to make itself felt on NASA. On February 21, 1974, when Captain Lee testified before Chairman Fuqua's Subcommittee on Manned Space Flight, he announced that the \$10 million allocated to experiments had been increased to \$16 million. This prompted the following interchange:

MR. FUQUA. Then do you think we could justify this mission without a rendezvous with the U.S.S.R.?

Captain LEE. Yes, sir. I'm convinced now, with the additional effort we have expended on experiments that we have a good experiment package now.

Congressmen Camp and Winn then expressed enthusiasm, noting the difference in cooperative spirit by the Soviets, as contrasted with the experience Teague and Winn had had in 1972. Referring to Leonov, the Soviet commander of Soyuz, Camp and Winn stated:

MR. CAMP. When we were in the Soviet Union, they were very, very cooperative. We spent a day with Leonov, who briefed us, and you just couldn't ask for a better association. Would you agree, Mr. Winn?

MR. WINN. No doubt about it, compared to about a year before that.

Despite the impact which the committee was making in expanding the experiment package albeit by a small amount—Teague still felt skeptical about the Soviet contribution. On July 22, 1974, Teague made this statement for the Congressional Record:

Mr. Speaker, in a recent editorial in the Eagle of Bryan, Texas, on July 13, the comments made by the writer were on a subject which I have been pondering for

several years. The editorial discusses the upcoming joint United States-U.S.S.R. orbital space docking of an Apollo capsule and a Soyuz capsule.

The NASA team has devoted many long months of work to the success of this project and I am very optimistic that they will maintain their perfect record. The only question in my mind is the definition of "success" in this endeavor. It is intended to be an exchange of scientific and technological knowledge. It seems that at this time the editorialist is correct when he writes: "The U.S.-Soviet test project promises no technological benefit to this country."

The very simple reason that the statement is true is due to the Soviet's shroud of secrecy around their space program. Although there is little hope that their policy will change, I continue to pray that it will change.



Astronaut Thomas P. Stafford joins Cosmonaut Alexei A. Leonov at the hatchway between the Apollo and Soyuz spacecrafts.

APOLLO-SOYUZ A SUCCESS—1975

Editorials and letters continued to attack the project throughout 1974. The Los Angeles Times dubbed ASTP the "wheat deal in the sky." A writer from Stamford, Conn., wrote President Nixon that when he couldn't get the gas to go to work, he couldn't see "spending millions of dollars not to mention energy—for one lousy interplanetary handshake between some little-league Hop Harrigan and his Russian counterpart. * * * If you think you've got troubles with Watergate, wait till the American people—your silent majority—wise up to this little boondoggle."

As planned, the Apollo-Soyuz mission was successfully flown on July 15, 1975. What started out essentially as an answer to the need for some kind of an international rescue system successfully developed

into a rendezvous, docking, and crew exchange mission, and with the intervention of the committee a full and useful set of experiments was included in the ASTP program.

DISPA—1975 76

When the committee jurisdiction expanded in 1975, the Subcommittee on International Cooperation in Science and Space was merged into a new subcommittee called Domestic and International Scientific Planning and Analysis. At the opening of the 94th Congress in 1975, Representative Robert A. Roe (Democrat of New Jersey) was designated as the first chairman of the new subcommittee.

Roe immediately called an organization meeting for January 29, at which the old and new jurisdiction of the subcommittee was mulled over. Roe told his new subcommittee:

I am aware that some members of the subcommittee have an interest in particular subjects, and I would like to hear from all the members regarding their individual interests. Within the next several weeks I would hope that we can arrive at an idea of what the subcommittee should give short-range and long-range priority to.

Fate intervened to cut Roe's chairmanship short. Representative John Kluczynski, one of Roe's colleagues on the Public Works and Transportation Committee, died and thus opened up a subcommittee chairmanship for Roe on that committee.

On February 4, 1975, Roe told Chairman Teague that it might be possible under the Democratic caucus rules for him to retain his Science Subcommittee chairmanship in light of the fact that the latter had oversight and not legislative jurisdiction. Roe referred to the caucus rule precluding any Member from serving as subcommittee chairman of more than one legislative subcommittee. He told Teague that the issue put him "in a possible gray area of interpretation." Finally, Roe wrote Teague in March, formally submitting his resignation as subcommittee chairman:

Although the propriety of my retaining the chairmanship of this Subcommittee does not appear to be in conflict with the rules of the House, as best we were able to ascertain at this writing, the fact that it has given rise to some evidence of doubt in the first instance prompts me to take this action.

Two days later, Representative Ray Thornton (Democrat of Arkansas) wrote Teague:

As we have discussed, I would like to serve as Chairman of the Subcommittee on Domestic and International Scientific Planning and Analysis. Congressman Roe told me today that he has submitted his letter of resignation, and I would certainly enjoy the opportunity to serve in this capacity.

In this way, Arkansas got its first subcommittee chairman on the Science Committee, with the following members in 1975:

Democrats

Ray Thornton, Arkansas, *Chairman*
 Robert A. Roe, New Jersey
 Dale Milford, Texas
 James H. Scheuer, New York
 Henry A. Waxman, California
 Jerome A. Ambro, New York
 James J. Blanchard, Michigan

Republicans

John B. Conlan, Arizona
 John Jarman, Oklahoma
 Gary A. Myers, Pennsylvania



Representative Ray Thornton (Democrat of Arkansas).

RAY THORNTON AS CHAIRMAN

After serving as attorney general of Arkansas, Ray Thornton was elected to the House in 1972 from a huge district comprising the entire southern third of the State and bordered by Mississippi, Louisiana, Oklahoma, and Texas. Possessing a fine legal mind, Thornton gained national renown during the televised Judiciary Committee hearings on President Nixon's impeachment. He was very well liked in the Congress and on the committee because of his fairness, thoroughness, and good sense of humor. In manner, he was deliberate and judicious, never flamboyant, and always constructive and cooperative.

Thornton introduced a number of innovations in the fashion he ran the subcommittee. First, being a well-organized individual, he directed that every public hearing be preceded with a published committee print which set the background and framework for the hearing; and that every hearing be followed by a report containing summary, recommendations, and conclusions arrived at during the hearing. The central responsibility for overseeing the preparation for the hearings and reports fell on the shoulders of staff director Dr. John D. Holmfeld. Dr. Holmfeld joined the committee staff in 1971, after receiving his degree in mechanical engineering from MIT and obtaining a Ph. D. in "Science, Technology and Public Policy." The committee drew heavily on the Science Policy Research Division of the Congressional Research Service for assistance in the preparation of subcommittee reports.

Second, Thornton always made sure that his subcommittee members were thoroughly briefed in both a formal and informal fashion. He started a series of breakfasts with subcommittee members for informal discussions of issues to come up before the committee. When few members showed up, Thornton contacted them on the House floor instead. Whenever he scheduled an organization meeting or planning session of any sort, Thornton made a point of providing his subcommittee members with briefing papers in advance and conclusions afterward. And if a subcommittee member did not show up for a meeting, you could be sure he would get a written summary of what happened in the next day's mail.

Third, Thornton fully recognized the tremendous breadth of new jurisdiction which his subcommittee had, as a result of the 1974 reform amendments which gave the Science Committee "special oversight" over all nonmilitary research and development. In order to give his subcommittee members a thorough insight into the meaning of "special oversight," Thornton arranged for Representative Richard Bolling (Democrat of Missouri) to brief the subcommittee. As Chairman of the Select Committee on Committees, Bolling had been a leading force in giving special oversight jurisdiction to the Science Committee.

Rule X of the House of Representatives now provides:

The Committee on Science and Technology shall have the function of reviewing and studying, on a continuing basis, all laws, programs and Government activities dealing with or involving non-military research and development.

INTERNATIONAL IMPLICATIONS OF EARLY HEARINGS—1975

June 1975 was a hectic month for the new subcommittee, which plunged ahead with four days of hearings on the Federal research and development program as well as starting hearings on agricultural research and development. The Federal R. & D. hearings were wide-

ranging and were focused on a recent report on the subject by the Federal Council on Science and Technology. Most of the hearings were directed at domestic concerns, yet occasionally there were clear implications for world trade, international cooperation, and the comparative technological standing of the United States vis-a-vis other nations. At first blush, it might seem the agricultural research area might be more domestic in nature, but in fact the hearings blossomed out into considerations of the world food problem. The Thornton subcommittee teamed up with the Subcommittee on Science, Research and Technology chaired by Congressman Symington, extended the hearings into September and October and also held field hearings in Texas, Arkansas, and Missouri. The two subcommittees used the unique technique of publishing an "Interim Report" for widespread discussion purposes, followed by a final report with 15 recommendations for the improvement of agricultural research to meet emerging world food needs. The two subcommittees agreed that the Malthus doctrine and predictions that increasing population would outrun food supply might be too extreme. But they concluded it was vital that national leaders should start thinking more seriously about the problems Malthus first analyzed in 1798.

One of the recommendations of the Thornton subcommittee was:

Competitive procedures for the award of agricultural research grants should be more widely employed.

IMPACT OF THORNTON SUBCOMMITTEE RECOMMENDATIONS

The subcommittee recommended that the Department of Agriculture, instead of just giving so much money to land grant colleges and agricultural experiment stations, should adopt the system utilized by the National Science Foundation whereby proposals would be submitted and judged competitively on their merits. This is precisely what was done, with an alumnus of the National Science Foundation transferring to the Department of Agriculture to help set up the new system.

The Thornton subcommittee was also successful in getting the Department of Agriculture to reorient its research to provide more support for those areas vital to future U.S. and world food needs. An additional mark of the effectiveness of the subcommittee was the fact that Dr. Holmfeld was detailed on loan to the House Committee on Agriculture in 1977, where he drafted the research section of the massive legislation passed that year. Dr. Holmfeld then had an opportunity to capitalize on the information elicited and the recommendations made in such areas as establishing competitive grants and reorienting agricultural research.

TECHNOLOGY TRANSFER TO OPEC COUNTRIES

Late in October 1975, Thornton's subcommittee conducted hearings on "Technology Transfer to the Organization of Petroleum Exporting Countries," with emphasis on Saudi Arabia and Iran. In announcing the hearings, Thornton indicated:

As the OPEC member nations recycle oil profits, new opportunities for the participation of American business and industry have emerged. The subcommittee is interested in the short and long term impacts on the United States associated with the transfer of advanced technology to the OPEC nations.

In 1976, the subcommittee made a number of recommendations growing out of the hearings, including the suggestion that there be established a single body with clearly defined authority to oversee and coordinate all governmental authority in the field of technology transfer. In a sense, this is the position which Dr. Frank Press, Director of the Office of Science and Technology Policy holds in the Executive Office of the President, although he has been somewhat circumscribed in this particular area by lack of adequate staff.

U.S.-U.S.S.R. COOPERATIVE AGREEMENTS—1975

In November 1975, the Thornton subcommittee had three days of oversight hearings on "U.S.-U.S.S.R. Cooperative Agreements in Science and Technology." In opening the hearing, Thornton remarked:

The purpose of these hearings will be to evaluate the status of the American-Soviet bilateral research program since the first accords were signed at a summit meeting in Moscow in May 1972.

The consensus of the witnesses was that:

- The program overall was moderately successful.
- Progress, although unevenly developed, had been mutually beneficial thus far.
- The potential for future scientific benefits exists for both parties.

Dr. Frank Press cochaired the Joint Commission on Soviet-American Research with its counterpart in Moscow and the hearings and report of the Thornton subcommittee were helpful in stimulating a greater degree of coordination in this area.

In June and July of 1976, the Thornton subcommittee in conjunction with the McCormack Subcommittee on Energy Research, Development and Demonstration had four days of joint hearings on the subject of "International Cooperation in Energy Research and Development." The hearings focused on the relationship between the United States and other nations in resolving the energy issue, and particularly the role played by research and development in these relationships.

In addition to the many prehearing and posthearing documents produced by the Thornton subcommittee, they cranked out a steady

series of other publications relating to international cooperation and country programs. Particularly helpful were two publications on the People's Republic of China, sponsored by the subcommittee and prepared by Dr. Langdon Crane and Leo A. Orleans, experts on China in the Library of Congress: "A Study of Science in China," and an "Annotated Bibliography on Science and Technology in China."

COUNCIL OF EUROPE CONFERENCE IN 1975

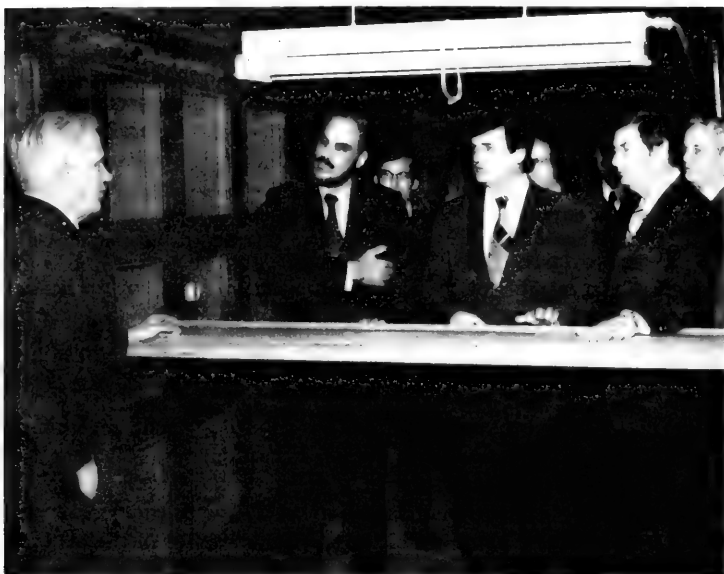
From November 12 to 14, 1975, Congressman Mosher served as the congressional member of the U.S. group attending the Fourth Parliamentary and Scientific Conference of the Council of Europe, held in Florence, Italy. The Conference was a follow-on to the Lausanne Conference in 1972, at which the Science Committee had been represented by Congressman Symington.

There were 140 parliamentarians, scientists, and government officials from 18 countries who attended the Conference. Among the participants in the Conference as a delegate was Hon. Emilio Q. Daddario, a former subcommittee chairman on the Science Committee while a Member of Congress, and at the time Director of the Office of Technology Assessment. Also taking part in the Conference was Dr. John D. Holmfeld, at that time staff director of the Domestic and International Scientific Planning and Analysis Subcommittee.

The theme of the Florence Conference was "Science and the Future of Man in European Society." In his concluding observations on the Conference, Mosher noted the "lively discussion" stimulated by Daddario's paper on technology assessment, which resulted in one of the Conference recommendations that analytical forecasting capabilities be made increasingly available. Mosher also noted the favorable evidences of international cooperation in space research through the European Space Agency, and recent cooperative efforts in the field of energy research and development.

Mosher's report was refreshing in that it did not repeat the usual clichés about "mutually beneficial exchange of views" which form the boilerplate of all too many international conferences. Mosher commented:

Throughout the conference, there was an air of frustration concerning the virtual impotence of European parliaments to take initiatives, marked by a bit of envy of the U.S. Congress. * * *. I came away from the conference with renewed faith in the U.S. system of democratic government and in the "checks and balances" provided by our Constitution. Despite occasional false starts, inefficiencies and divided opinions, the U.S. Congress has demonstrated a willingness to tackle the problems looming in the future with confidence in our scientific and technological capabilities to meet the challenges ahead.



Dr. Richard T. Whitcomb (left), inventor of the supercritical wing, providing significant increases in the speed and range of supersonic aircraft, briefs committee members at NASA's Langley Research Center: Representatives James H. Scheuer (Democrat of New York), Michael T. Blouin (Democrat of Iowa), and Don Fuqua (Democrat of Florida). At right is Ralph N. Read of the committee staff.

DISPAC—1977-78, CHAIRMAN SCHEUER

It's difficult to assemble enough adjectives to describe Representative James H. Scheuer (Democrat of New York), who became chairman of the subcommittee renamed "Domestic and International Scientific Planning, Analysis and Cooperation" at the start of the 95th Congress in January 1977. He has been variously called "brilliant, crazy, multifaceted, aggressive, witty, concerned, undisciplined, strong-willed, and compassionate." There are very few subjects or areas in this world which do not intrigue him, frequently to the point of grabbing the phone and asking the committee to get up some new hearings. Scheuer loved a good fight in a good cause, thrived on aggressive opposition, and was absolutely fearless when it came to "rushing in where angels fear to tread." Someone once described Scheuer as "a loose cannon on a deck," which implies tremendous power without direction, but he usually knew where he was going when he started out. Intellectual curiosity impelled him to travel many bypaths in his restless search for truth and justice. Long after other subcommittee

members had drifted off to perform constituent chores, Scheuer was earnestly squeezing the last possible drop of information out of witnesses, way past the usual hour for lunch.

A graduate of Swarthmore College, Scheuer had a law degree from Columbia, as well as a degree in industrial administration from the Harvard Business School. He was an active and highly successful developer of residential communities under the Federal urban renewal program and was first elected to Congress in 1964. He joined the committee in 1975. In 1977, the DISPAC Subcommittee included the following members:

Democrats

James H. Scheuer, New York, *Chairman*
 James J. Blanchard, Michigan
 Stephen L. Neal, North Carolina
 Anthony C. Beilenson, California
 Dan Glickman, Kansas
 Albert Gore, Jr., Tennessee
 Dale Milford, Texas

Republicans

Carl D. Pursell, Michigan
 Robert S. Walker, Pennsylvania
 Edwin B. Forsythe, New Jersey

The Committee Rules for the 95th Congress gave DISPAC the following jurisdiction:

Special oversight and evaluation of single agency, nonmilitary research and development programs for those agencies not included in the jurisdiction of other subcommittees; legislation, oversight, and other matters relating to intergovernmental mechanisms for research, development, and technology transfer; international technology transfer and technology, including bilateral agreements and relationships to foreign policy; and interagency and international coordination of population-related research and development, including food, crime control, health, housing, and resources, not within the jurisdiction of other subcommittees.

Even before the formal organization meeting of the subcommittee, Scheuer had an expansive letter off to Chairman Teague on January 27, 1977, outlining both the domestic and international areas of interest of some of the subcommittee members with whom Scheuer had talked. In his first rough cut at the work ahead, Scheuer stressed "the extremely broad scope of jurisdiction of the subcommittee, and the strong interest the subcommittee members have expressed in developing an active program for the subcommittee."

The staff director of the Scheuer subcommittee was Dr. William G. Wells, Jr. (see page 255), who operated in a pressure-cooker atmosphere to stay abreast of the multifarious subject areas which the subcommittee tackled in 1977-78.

At the organization meeting on February 24, Scheuer commented:

Our top staffer, and we are lucky to have him, is Bill Wells. I have worked with Bill Wells in Jimmy Symington's committee and he is terrific. * * * We have such

an incredible abundance of riches, I think our main problem is going to be to focus in on some kind of ranking by priority of what we want to do first, second and third.

JURISDICTIONAL PROBLEMS

Scheuer remarked also that he was "keen on doing something (in) international cooperation in the area of nuclear theft, blackmail, hijacking, terrorism, assassination, kidnapping and the like." His mode of operation was to barge ahead, regardless of jurisdictional problems, urging joint hearings or joint action with other committees where possible but getting the job done in any event. It did not discourage Scheuer one whit to run into opposition, as he did on the issue of nuclear theft.

Chairman Melvin Price (Democrat of Illinois) of the House Armed Services Committee and several other members protested to Teague, following publication of a Jack Anderson column that the Scheuer subcommittee was planning an investigation of possible theft of nuclear weapons. Teague informed Scheuer:

I have assured Chairman Price that neither the Committee on Science and Technology nor any of its Subcommittees will undertake any investigation relative to the security of nuclear weapons—a subject clearly under the jurisdiction of his Committee. * * * It is incumbent upon your Subcommittee to coordinate closely with those Committees prior to making a public announcement of these activities and to insure full cooperation and no misunderstanding of intentions. In the future, I want to be kept fully informed on the status of our cooperative initiatives as well as the progress of your activities.

Thereafter, Scheuer kept closely and personally in touch with Teague on the many activities in which the subcommittee engaged, and Teague backed him up in his many efforts to get into new initiatives in oversight. Although poles apart in their political views, Teague and Scheuer had the kind of mutual regard which prompted Scheuer to write Teague on December 24, 1978:

While we may have held different political views from time to time, I and others always could rely upon your fairness, dedication, integrity, and deep understanding of the Congress as a place where the people's business must be conducted and conflicting ideas must be reconciled in peaceful ways. It would be my hope that newer, younger Members of Congress would look to you and your career as a way of understanding what it takes to become a great legislator.

LAW OF THE SEA CONFERENCE

One of the first issues tackled by the subcommittee in 1977 was an oversight review of the past progress and future prospects for the Third United Nations Law of the Sea Conference, which met in May. The subcommittee held three days' hearings at the end of April, reviewing oceanographic research and seabed mining, among other topics. Committee staff member Leslie Loflin assisted with the hearings.

There were several unique characteristics of this first set of subcommittee hearings: Chairman Scheuer conducted the hearings in a panel form, with several witnesses at the table at the same time; Scheuer allowed other subcommittee members, like Blanchard and Beilenson, to preside over some of the hearings; he insisted that witnesses summarize their statements orally to speed along the time when the members could get to the questions which concerned them (Scheuer even resorted to an unprecedented placement of his own opening statement into the record, an opening statement which included the phrase: "I will 'practice what I preach' with my opening statement").

This desire to get into problems whenever they arose perhaps accounted for another jurisdictional clash with the Committee on Merchant Marine and Fisheries, whose chairman, Representative John M. Murphy (Democrat of New York) grumbled to Speaker O'Neill that Scheuer's subcommittee was exercising "predatory jurisdictional initiatives" in its Law of the Sea hearings. Scheuer responded to Murphy somewhat tartly that his subcommittee was merely utilizing its oversight jurisdiction. This time, Teague did not dignify Murphy's jurisdictional protest, as he had on the nuclear theft issue, and the Speaker did not interfere in the controversy either. By standing its ground and brushing aside protests, the subcommittee strengthened its position. The following year, the subcommittee could claim that "support was provided to the Committee on Merchant Marine and Fisheries" on the "Deep Seabed Minerals Resource Act" which came out of the Merchant Marine Committee.

In a letter to Secretary of State Vance following conclusion of the hearings, Chairman Teague outlined some of the subcommittee findings, including concern expressed by the scientists who testified that the Law of the Sea conferees not surrender the freedom of scientific research in coastal waters. Teague also intervened with the Speaker to get Scheuer and Representative George E. Brown, Jr. (Democrat of California) appointed as additional congressional advisers to the Law of the Sea Conference delegation. Copies of the Teague-Vance correspondence were forwarded to all the other congressional advisers and Representative Paul N. McCloskey (Republican of California) responded to Teague:

These issues are so complicated, and the balance between competing U.S. interests so delicate, that I am delighted that your Committee is taking such a careful and serious interest in the problem at this early date.

COMPARATIVE CRIMINAL JUSTICE

In connection with its interest in international crime, the subcommittee had a briefing on Interpol on May 25, 1977, shortly before

various members visited the Interpol headquarters in St. Cloud near Paris, France. There followed an interesting illustration of how a jurisdictional clash was averted. DISPAC planned to hold oversight hearings late in June 1977 on the Federal role in criminal justice and crime research. Following staff conversations with the Judiciary Committee's Subcommittee on Crime, Scheuer received a negative phone call from Representative John Conyers, Jr. (Democrat of Michigan), contending that his jurisdiction was being invaded and the hearings should not be held. Scheuer took three steps: He had it checked out with the House Parliamentarian's office to verify that DISPAC had the special oversight jurisdiction, he got together for a private confab with Conyers in the Rayburn reception room off the House floor, and he wrote to Conyers:

I sincerely hope that you will lend our subcommittee the full weight of your prestige and wise counsel by opening our hearings with me on the morning of June 21, 1977.

When the big day arrived, there was Conyers with his gavel, starting off the joint hearings and adding after his opening statement:

And I now introduce the cochairman of these hearings, the distinguished gentleman from New York, and my colleague, Jim Scheuer, who has, with his staff, played a very primary role in lining up the witnesses and preparing for this analysis of the Federal role in criminal justice and crime research.

The subcommittee's recommendations following the hearing were highly influential in the President's decision to move on the establishment of a National Institute of Justice within the Department of Justice, and they also set a standard for cooperative joint hearings.

The President's interest in the work of DISPAC was expressed in a letter from President Carter to Chairman Scheuer on December 28, 1977. The President noted:

My staff has brought to my attention your committee's excellent draft report on the subject, and I appreciate your committee's work in its preparation. Many of its recommendations speak to important problems in the area of justice research, and I feel confident that, working together, we can begin to solve these problems.

The subcommittee's interest in comparative criminal justice research was evidenced by the presence of a DISPAC staff member, Jonah Shacknai, at the November 1977 symposium in Berlin, Germany sponsored by the Aspen Institute. As a direct result, the subcommittee published a report on "Comparative Criminal Justice Research" in June 1978, which laid down a challenge to the nations of the world, as well as to international cooperative mechanisms, on what yet had to be accomplished in this area.

NUTRITION

Following up some of the pioneering work by the Thornton subcommittee on agricultural research and world food needs, the subcommittee in 1977 and 1978 held several hearings and produced useful oversight reports on nutrition research and surveillance, as well as the recommended dietary allowance standards. Although most of this work was aimed at domestic nutrition needs in this country, the findings and recommendations were also directed at research priorities and accomplishments on the international level. The General Accounting Office also issued a report supporting the conclusions of the DISPAC Subcommittee, leading to an administration decision to develop a comprehensive nutrition status monitoring system.

In September 1977, the subcommittee published a study prepared by Leo A. Orleans, China specialist at the Library of Congress, entitled "The Role of Science and Technology in China's Population Food Balance."

In a letter to Dr. George K. Davis of Gainesville, Fla. on April 4, 1979, Fuqua observed:

Nutrition research is the subject of attention in several committees of the House, including my own Science and Technology Committee. In our Subcommittee on Science, Research and Technology, we have reviewed this area, and we are right now making plans for additional hearings this year. I am hopeful that by putting the spotlight on this area we can make more people aware of the need for a strengthening of the research efforts in nutrition.

"APPROPRIATE" TECHNOLOGY

On February 27, 1978, Scheuer wrote to Secretary of State Cyrus Vance:

Along with others in the Congress, I have been pleased by the positive steps taken by the Administration and the State Department in elevating the roles of science and technology in foreign policy matters.

Scheuer then penned a long postscript on his letter, including the following:

Estimates are that the Third World developing nations will need one billion additional jobs by the year 2000 to employ the flood of new entrants into the job market expected by then. Thus, while sophisticated capital intensive high technology might be appropriate in selected cases in the developing world, a major emphasis should be on encouraging appropriate, cost effective, labor intensive technology for developing countries, with exceptions where justified by circumstances.

In July 1978, the subcommittee held a week of hearings on how to improve on the technology being utilized in the developing nations, with emphasis on "appropriate technology" which would meet the

needs of the people instead of concentrating on heavy capital, prestige projects. The July hearings were followed up by DISPAC participation in an international forum on appropriate technology held in New Delhi, India, in November 1978, attended by Staff Director Wells.

Brown's particular interest in furthering appropriate technology stimulated greater activity by the SRT Subcommittee when Brown became its chairman in 1979. Fuqua added, during the House debate on the NSF authorization bill on March 27, 1979:

At the committee's request, the Science Foundation prepared a program plan in appropriate technology, with full public participation in the plan's formulation. The plan recognizes that "appropriate technology" applies to urban as well as rural areas, and the Foundation has been directed to involve new participants in its implementation, including community groups, community colleges, small businesses and others who are not in the mainstream of NSF's normal collegiate grantees and constituents.

The bill before you authorizes a total of \$4½ million to implement the appropriate technology plan and specifies that \$1½ million of the total be spent in the science education directorate for the public education needed in getting the best return from this investment.

SCIENCE, TECHNOLOGY, AND DIPLOMACY ACT OF 1978

Back in the days when the committee was concentrating on NASA, NSF, and a narrow group of scientific operations, jurisdictional overlaps with other committees were less common. With the burgeoning new responsibilities, especially general oversight authority, a new relationship was developing with other congressional committees. An interesting illustration occurred in 1978 in the cooperative work carried out with the House Committee on International Relations.

Title V of the Foreign Relations Authorization Act in 1978 for the first time set forth a national policy on the application of science and technology to foreign policy, directing the Secretary of State to assume a greater role in the coordination and oversight of international scientific and technological activities. The concept was closely related to the long-time efforts which the committee had exerted, climaxing in 1976 with the legislation which set up the Office of Science and Technology Policy in the White House. At the same time, the House Committee on International Relations had been working for years on appropriate legislation to define the relation of science and technology to diplomacy. As matters finally came to a head in the spring of 1978, one course of action would have been for the Science Committee to wage holy war to protect its jurisdictional turf, or at the very least insist on the right to hold hearings and make its own committee recommendations.

Instead, upon being presented with the alternatives developed by Bill Wells, DISPAC staff director, Chairman Teague offered a warm and friendly olive branch to Chairman Clement J. Zablocki (Democrat of Wisconsin) of the International Relations Committee in a letter dated April 6, 1978:

You are to be congratulated for proposing forceful action in areas long neglected by a succession of Administrations. Your objectives are crucial to the long-term interests of the United States and your proposals deserve extensive consideration by the Congress.

In addition to offering our support, I would like to suggest that an informal working relationship between our respective committees might be useful to you in bringing your proposals before the House. In no way am I proposing sequential referral of legislation; such experience and expertise as have been developed over a number of years in working on the international scientific and technological programs of agencies under our jurisdiction would be on call to you as desired.

Chairman Teague's offer was immediately and warmly accepted by Chairman Zablocki. At the direction of both Teague and Scheuer, the staffs of the Science Committee and the International Relations Committee worked closely together, at first on a separate bill introduced by Zablocki, and then later when the Zablocki bill was incorporated as title V of the Foreign Relations Authorization Act which passed in 1978.

In 1979, the Secretary of State reported to the Congress on title V, and concluded that the impact of its provisions would be felt most strongly in three areas:

- long-term planning related to the interaction of science, technology and foreign policy;
- procedures for interagency coordination of international scientific and technological activities; and
- procedures for recruiting, training, and motivating personnel to carry out title V's objectives.

In a well-planned and coordinated effort, the committee jumped in and helped the House Foreign Affairs Committee beat down an attempt by the House Appropriations Committee in 1979 to slash the funding for the State Department's Bureau of Oceans and International and Scientific Affairs. The cut was a deep one—over 50 percent. On July 12, 1979, Fuqua, McCormack, and Lloyd teamed up to speak out for full restoration of the \$3 million cut. Fuqua told the House:

In every area that the Committee on Science and Technology has worked we find, more and more, that science and technology has become a significant influence on the international scene. * * * When we have agencies that do not perform as we think that they should—and this agency is not totally innocent of that—I think we should strive—and it is our responsibility—to improve that performance rather than trying to cripple the agency by drastic cuts in budgets.

McCormack praised the effective work of the science attachés he had met in his worldwide travels. Lloyd, drawing on the experience of his recent trip to Mexico (see chapter XV), stressed the value of technology transfer in international relations. On a division (standing) vote, the cut by the House Appropriations Committee was restored by 175-62.

TRANSFER OF TECHNOLOGY TO OPEC COUNTRIES

To follow up on the 1975 hearings by the Thornton subcommittee, in September 1978, the DISPAC Subcommittee held an oversight review of technology transfer to the members of OPEC. As Scheuer noted in a July 28 letter to Teague:

Beginning on September 6th, for three days we plan to do an "update" on Ray's earlier initiative on OPEC technology transfer. Much has happened during the past three years as petrodollar surpluses have built up in various OPEC nations' accounts. Moreover, technology transfer from the United States has been cited by Saudi Arabia as a high priority item; it is my belief that finding more ways of "recycling" petrodollars is urgent and that attractive "technology transfer" packages should be developed to facilitate this process.

U.S.-U.S.S.R. COOPERATIVE AGREEMENTS—1978

Later in September 1978, the DISPAC Subcommittee launched another set of hearings to update the work of the Thornton subcommittee in the area of U.S.-U.S.S.R. relationships. The 1978 hearings covered three separate issues, scientific exchange of persons, technology transfers, and some of the impediments to both, including human rights considerations and science policy.

On February 1, 1979, Hollenbeck, with the assistance of Anthony Scoville of the committee staff, drafted a persuasive letter to Dr. Frank Press, Director of the Office of Science and Technology Policy, expressing deep concern for the physical safety and condition as well as the intellectual freedom of Soviet scientists and nonscientists. The letter was cosigned by Brown, Scheuer, Harkin, and Glickman, and included these comments:

As members of the Committee on Science and Technology concerned for the long-term health of science, at a time when solutions to the problems of energy and materials shortages, of environmental quality and of social change depend upon unfettered intellectual curiosity, we believe that human rights must be axioms of science policy; we believe that the United States ability to retain intellectual and technological leadership depend upon the spiritual respect which we command for championing the political, intellectual, and economic rights of individuals here and in other nations.

Similar sentiments were expressed in the committee views in the NSF authorization report released March 21, 1979. The committee

noted its great concern with the infringement of civil, political, and cultural rights of scientists and technologists in many nations. The report added:

The committee encourages the National Science Foundation and the National Science Board to determine that their activities, including the support of scientists, and the operation of scientific facilities, will enhance and not detract from the civil, political, and cultural rights of scientists at home and abroad.

U.N. CONFERENCE ON SCIENCE AND TECHNOLOGY

In preparation for a major worldwide United Nations Conference on Science and Technology for Development, scheduled for Vienna, Austria, in August 1979, the DISPAC Subcommittee worked actively with the State Department and the U.S. coordinator, Ambassador Jean Wilkowski, in planning the Conference. For example, Dr. Wells was the House of Representatives adviser to the U.S. delegation for the second preparatory meeting in Geneva, Switzerland, in February 1978.

On December 21, 1978, in one of his last acts before leaving office, Teague wrote to House International Relations Committee Chairman Zablocki suggesting a joint seminar on the upcoming U.N. Conference:

It would seem that this kind of cooperative effort would be mutually beneficial and is quite compatible with our respective interests and jurisdiction. Your work with State and AID is complementary to ours in dealing with the international programs and capabilities of agencies such as the Departments of Energy, Commerce, Agriculture, and the Interior—along with the National Aeronautics and Space Administration, the National Science Foundation, the National Bureau of Standards, and the National Oceanic and Atmospheric Administration.

Clem, let me take this opportunity to say that I am happy that Don Fuqua will be taking over from me in the 96th Congress. I know that he will want to maintain the same warm, close relationship that you and I have had over the years.

Fuqua followed up and arranged the joint seminar on February 13-15, 1979. Frequent staff contacts with the planners for the Vienna conference were held in the ensuing months.

On May 18, 1979, the National Science Foundation Advisory Committee for International Programs met with the subcommittee to discuss, among other things, the plans and problems relating to the upcoming Conference.

On July 17, 1979, the SRT subcommittee held a joint hearing with the Senate Subcommittee on Science, Technology, and Space, to examine the U.S. initiatives for the Vienna Conference. Brown stressed the need for "bold initiatives," adding:

What the United States is begging for is strong leadership in the direction—almost any direction that would get us off dead center. The global situation requires the same sort of approach, and this forum in Vienna provides the opportunity.

Among Science Committee members who attended the Vienna Conference were Fuqua, McCormack, Brown, Scheuer, Harkin, Winn, and Hollenbeck.

OTHER DISPAC ACTIVITIES

This chapter does not deal with the many domestic activities in which DISPAC participated, such as research into violent behavior, the role of research and development in improving the quality of urban life, computers and the learning society, new drug approval procedures in the Food and Drug Administration, computers and technology and the cost of health care, and research into criminal sentencing. It is amazing to contemplate the tremendous variety of different subjects and areas tackled by DISPAC. Somehow in between other duties, Chairman Scheuer managed to take two monthlong trips to Asia (including the People's Republic of China) and also to visit Europe. In April 1978, DISPAC published Scheuer's personal report on "The Growing Awareness of Population and Health Issues in Africa," a sensitive 125-page appraisal on the national family planning programs and population concerns in six sub-Saharan nations. It all started when Teague asked Scheuer to attend the Intelsat Conference in Nairobi, Kenya, in October 1976 and mushroomed out from there somewhat typical of the fashion in which DISPAC itself mushroomed out to cover a vast smorgasbord of activities.

Somewhat symptomatic and symbolic of DISPAC's awareness of what might crop up tomorrow crept into a memorandum which staff director Wells sent to committee deputy director Gould on December 14, 1977, in response to a request for a detailed DISPAC budget for 1978. Dr. Wells, after furnishing specifics down to the dollar and cents of what would be required for consultants, travel, and other expenses, slyly slipped in the following one-liner at the very end of his memorandum:

Contingency Fund: \$100,000. You never know what is going to come up!

EUROPEAN OVERSIGHT TRIP

From May 28 through June 3, 1977, eight members of the House Committee on Science and Technology, accompanied by three members of the House Committee on Public Works and Transportation conducted an oversight trip to Germany, England, and France. A great measure of the trip was devoted to international science policy, including briefings and question and answer sessions at the following organizations and installations:

International Atomic Energy Agency, Vienna, Austria.

International Institute for Applied Systems Analysis, Laxenburg, Austria.

United Nations Industrial Development Organization, Vienna, Austria.
 Westfield Coal Gasification Facility, Westfield, Scotland.
 French Nuclear Industrial Center (Phénix), Marcoule, France.
 International Energy Agency, Paris, France.
 Organization for Economic Cooperation and Development, Paris, France
 UNESCO, Paris, France.
 Interpol, St. Cloud, France.
 British Co-Gas Plant, Leatherhead, England.
 ERNO, Bremen, Germany.
 Paris Air Show, Paris, France.

The following Science Committee members participated in the European oversight trip: Teague, Wydler, Milford, Myers, Scheuer, Harkin, Dornan, and Hollenbeck.



Representative John W. Wydler (Republican of New York), right, is presented with a birthday gift of peanuts by senior Democrat, left, Don Fuqua. Also present for the 1978 ceremony was committee executive director and former Member Charles A. Mosher (Republican of Ohio) and Representative Harold C. Hollenbeck (Republican of New Jersey).

THE WYDLER REPORTS

Representative John W. Wydler (Republican of New York), following a committee oversight trip to the Soviet Union and several European nations, submitted two reports: "Oversight of European Nuclear Energy Development," printed in May 1978; and "Oversight of Soviet Nuclear Energy Development," which was printed in June

1978. Both reports were published by the committee as official committee prints. Congressman Wydler also took part in preparing the European Oversight Report mentioned above, in which he emphasized the international breeder technology being developed in Europe.



Representative George E. Brown, Jr., left (Democrat of California), and Robert S. Walker (Republican of Pennsylvania) teamed up to get the Antarctic Conservation Act of 1978 through Congress.

As ranking Republican Member of the Science Committee following 1977, Wydler took the lead in emphasizing the need for more aggressive action in support of nuclear breeder reactor development in the United States. In a hard-hitting letter to President Carter on April 4, 1978, Wydler stated:

Today, I am writing you from the perspective of a series of international energy discussions which I have just had with the Soviets. It is no exaggeration to say that we are on the verge of an "Atomic Sputnik" in terms of our nuclear policy vis-a-vis the Soviets. They are rapidly moving to build breeder reactor plants and deploy light water nuclear power plants so as to put us clearly in second place in the nuclear league.

ANTARCTIC CONSERVATION ACT OF 1978

In 1978, the Subcommittee on Environment and the Atmosphere, chaired by Representative George E. Brown, Jr. (Democrat of California), held joint hearings with a subcommittee of the Merchant Marine Committee on the Antarctic bill. The purpose of the legislation was to protect the unique plants and animals in the region, as well as the ecosystems on which they depend. The legislation authorizes the National Science Foundation to establish a permit and regulatory system to control the taking of plants and animals native to Antarctica, consistent with the terms of the Antarctic Treaty signed by 13 nations.

Representatives Edwin B. Forsythe (Republican of New Jersey) and Robert S. Walker (Republican of Pennsylvania) were active supporters of the Antarctic Conservation Act and spoke out for its passage in the House on September 25, 1978.

Forsythe contended:

The Antarctic Continent * * * represents a vast, unique laboratory still virtually unmodified by human activity. * * * If the integrity of the Antarctic ecosystems is maintained, we can continue to receive both knowledge and resources for future generations.

Walker explained:

This legislation takes a long overdue step toward implementing a set of agreed measures which were adopted in 1964 to protect the animals and plants in Antarctica in accordance with the treaty.

Chairman Brown, who piloted the bill through the Science Committee, remarked on the House floor:

This bill represents another example of the cooperative efforts of two committees, the Merchant Marine and Fisheries Committee and the Committee on Science and Technology, in developing legislation directed toward areas of mutual interest.

The President signed the bill into law on October 28, 1978.

The penguins, whales, seals, sea birds, and crustaceans lined up to greet Representative Tom Harkin (Democrat of Iowa), the latest of a long series of Science Committee visitors to Antarctica in December 1977.



Representative Tom Harkin (Democrat of Iowa) charms the Antarctic penguins as though they were voters.



A distinguished audience watches in awe as Congressman Harkin lures penguins in the Antarctic. From left, unidentified helicopter pilots; Dr. Norman Hackerman, chairman of the National Science Board; Representative John B. Breaux (Democrat of Louisiana); Dr. John B. Slaughter, Assistant Director of the National Science Foundation, and Dr. Thomas R. Kramer of the Science Committee staff.

In the annual National Science Foundation authorization bill, the committee authorized funds for carrying out the U.S. Antarctic program. The committee applauded the NSF decision to fund Antarctic research in 1979 at 22 percent above the level for 1978, with emphasis on marine ecosystems. On July 13, 1979, the House approved the NSF conference report which included \$55 million for the Antarctic area.

Also, the Brown subcommittee had two days of oversight hearings in May 1979 on the U.S. Antarctic program. Harkin presided over the sessions, which reviewed recent progress in Antarctic research.

INTERNATIONAL SPACE ACTIVITIES

In November 1978, the Subcommittee on Space Science and Applications published a report on "International Space Activities" which was based on hearings and a panel discussion in May and June 1978. In opening the hearings, Subcommittee Chairman Fuqua stated:

The subcommittee will review the opportunities for international cooperation in space as well as the economic and technological implications inherent in such cooperation.

The leadoff witnesses included Ambassador Peter Jankowitsch, permanent representative of Austria to the United Nations and Chairman of the United Nations Committee on Peaceful Uses of Outer Space; and Prof. Hubert Curien, representing the French Government. Other witnesses from Japan, Germany, Great Britain, and the European Space Agency were supplemented by testimony from NASA Administrator Frosch and the Department of State. In his opening statement, Fuqua also commended the study of "Worldwide Space Activities," prepared by the Congressional Research Service for publication by the Science Committee.

Out of 42 issues identified during the hearings and panel discussion, 8 were selected for more detailed consideration. The final report made some of the following recommendations:

- That the 1967 Outer Space Treaty be expanded to forbid any nation from claiming sovereignty over the geostationary orbit.
- That multipurpose space platforms be encouraged.
- That an equitable pricing policy be developed for communications, Earth observations and launch services.
- That a number of measures be taken to reduce the cost of international space activities.
- That more long-range cooperation of a multiyear nature be developed for cooperation in space sciences.

- That better information and education of how to acquire and use the data generated by Landsat be developed.
- That the control process for space-related exports be simplified and streamlined.
- That Intelsat be used as a model for other international space activities.

The committee also sponsored publication in 1978 of a study by Dr. Charles S. Sheldon II, Chief of the Science Policy Research Division of the Congressional Research Service, entitled "United States and Soviet Progress in Space."

In September 1979, the subcommittee held hearings on the activities of international bodies in space matters, as well as the international utilization and management of space systems. The subcommittee reviewed the current status of proposed actions on future space activities, including issues before the United Nations Committee on the Peaceful Uses of Outer Space and the international conference to establish global communications frequency regulations. Cost reductions through joint international space ventures were also explored.

INSTITUTE FOR SCIENTIFIC AND TECHNOLOGICAL COOPERATION

Members and staff of the Science Committee strongly supported the establishment of the Institute for Scientific and Technological Cooperation, which constituted title IV of the foreign aid bill in 1979. Fuqua and Brown both testified in support of the Institute before the House Foreign Affairs Committee on March 14, while Winn and Pease (Science Committee members who also served on the Foreign Affairs Committee) were outspoken advocates. Bill Wells and Paul Maxwell were the most active staff members lending assistance.

In his testimony before the Foreign Affairs Committee, Fuqua noted:

In the years that I have worked on this committee, I have had an opportunity to view at close hand the manner in which science and technology have brought major benefits to our economy and well-being. I have also seen that technology transfer by moving research data from the laboratory to useful application is a complex and difficult task. This administration is currently completing one in a series of broad-based studies in the innovative process. One thing emerges from those studies: The closer the research and development are to the users of R. & D., the more likely the application will be successful. I believe the same holds true internationally as domestically.

Fuqua illustrated with the example of the use of satellite-based educational television in India. He noted that this program, the ATS-6, succeeded because of the very close collaboration of American experts with the professionals in India. This avoided the usual pitfalls of people thousands of miles away designing and implementing research

which simply did not work. Through the influence of Fuqua and Brown, the word "scientific" was added to title IV.

Brown mentioned:

Our present development organizations have failed in addressing various problems in applying science and technology for development: Problems of long-term research and development needs; problems of addressing regional rather than country-specific needs; problems of organizational management to address effectively specific S. & T. applications; problems in attracting the needed and necessary expertise from our scientific and technological community.

When the AID bill was debated in the House on April 9, 1979, House Foreign Affairs Committee Chairman Clement J. Zablocki (Democrat of Wisconsin) noted that Fuqua and Brown had "presented their views before the committee and had a very strong influence on the members of the Foreign Affairs Committee who incorporated their views in the legislation in what is now title IV."

By the end of July 1979, both the House and Senate had passed the AID authorization bill with the Institute incorporated into it, the conference report had been adopted, and the legislation was then signed into law by the President.

UNITED STATES-CHINA SCIENTIFIC EXCHANGES

In May 1979, Brown set up a task force of his Subcommittee on Science, Research and Technology, chaired by Ertel, to explore United States-China scientific exchanges. The task force also included Ritter and Hance. Hearings were held in May and June, as part of a series on science exchanges and technology transfer with other countries, which in prior years had included reviews of research cooperation with the Soviet Union and technology transfer to the OPEC countries. Brown stated:

I am delighted that Allan Ertel has agreed to chair this task force which will review the status of science in China, the evolution of scientific exchanges between the two countries and the associated policy questions.

Ertel noted that his recent visit to China had impressed upon him both the great potential of China's science and the strong effort needed to bring many of the scientific disciplines up to world standards. He added:

Our hearings will serve to explore the questions of reciprocity in these exchanges, the extent of Federal expenditures in support of them, and their long-term implications for American and Chinese science.

On June 22, 1979, the Ertel task force examined the practice of acupuncture which had been developed primarily in China. Brown volunteered to have acupuncture performed on himself at the hearing, and the results were as good as predicted.

EUROPEAN OVERSIGHT TRIP IN 1979

Between June 6 and 12, 1979, five members of the Science Committee, accompanied by five members of other House committees and staff, visited England, France, and Germany. Fuqua, Wydler, Goldwater, Mrs. Bouquard, and Young made the trip.

In submitting Robert C. Ketcham's report on the trip, Colonel Gould remarked:

The committee developed a plan to conduct a rigorous review of as many key energy, space aviation and transportation facilities, and technology and environmental R. & D. as time permitted. The schedule and oversight activities were designed to give Members and staff a firsthand opportunity to assess the status and performance of our European allies in developing energy technologies, competing with the United States in aircraft production and cooperation with the United States in space.

Among the agencies and installations visited were the following: National Coal Board, International Energy Agency pressurized fluidized bed combustion facility, advanced flight deck development simulator, Culham Laboratory (magnetic fusion) and United Kingdom Atomic Energy Authority in England; Nuclear Research Center, Rheinbraun Co. (open pit coal mining), and International Transport Exposition in Germany; Phénix breeder reactor and waste management facilities, airbus production facilities, and Heads-Up display evaluation flight and Paris Air Show in France.



Representative Robert A. Young (Democrat of Missouri), left, shown here with then Secretary of Transportation Brock Adams (a former committee member). Congressman Young was among those who participated in productive European tour of space and energy facilities during June, 1979.

CONCLUSION

Down through the years, the Science Committee developed an expanding relationship not only with nations on every continent, but also with international organizations dedicated to greater cooperation in science and space. In the early years, international cooperation was primarily space-oriented and as scientific and technological activities expanded, the relations with other nations on space projects also flowered. Without an organized constituency to give biennial political credits at the polls, the members of the Science Committee nevertheless devoted an increasing amount of time and effort toward fostering international scientific cooperation. It was a far cry from the early days of the Science Committee when the watchword was how to overtake Russia in the space race, contrasted to 1979 when there were few activities or goals the committee pursued that did not have international implications.



Representative James H. Scheuer (Democrat of New York), left, at a meeting of the United Nations Commission on Narcotics Drugs in Geneva, Switzerland. At center is Mathea Falco, Assistant Secretary of State, Bureau for International Narcotics Matters, and at right is Representative Benjamin A. Gilman (Republican of New York).



From the start, Chairman Miller was a strong champion of the metric system.



Representative Robert McClory (Republican of Illinois), although not a member of the Science Committee, worked effectively for the passage of metric legislation..

Inching Toward the Metric System, 1959-79

Simon Langley invented the bolometer
Which is really a kind of thermometer
That can measure the heat from a polar bear's seat
At a distance of half a kilometer.

—*Anonymous.*

Not long before he left the Congress, Chairman Teague on November 27, 1978, sent a letter to Dr. Louis F. Polk, Chairman of the U.S. Metric Board, defining the policy intent of Congress in the Metric Conversion Act of 1975. Teague stated:

That policy is to facilitate the conversion to Metric use in our country in order to reduce the total cost and inconvenience to our people. The intent of the Act is that the Metric Board should seek to reduce the time needed to make the conversion and to coordinate the conversion activities so as to achieve the benefits of Metric use sooner and reduce the cost and inconvenience arising from an unduly prolonged period of dual use. Furthermore, the policy is based on the principle of voluntary participation and for that reason the Act specifically states that the Metric Board shall have no compulsory powers, but it *is* expected to give positive guidance to any and all who voluntarily choose to convert to Metric.

It was a long struggle, requiring a great deal of patient background work, before the committee exerted the leadership needed to enact legislation in 1968 and 1975 nudging the United States toward metrication.

The Science Committee was just three months old when the subject came up during oversight hearings which the committee was holding on May 21, 1959. Dr. Allen V. Astin, Director of the National Bureau of Standards, sketched the history of metric legislation in this country, including the much-overlooked 1866 law which firmly stated:

*Be it enacted * * ** That from and after passage of this act it shall be lawful throughout the United States of America to employ the weights and measures of the metric system.

Dr. Astin volunteered to the committee that the metric system "is the only system of measurement generally authorized for use in this country by act of Congress." He elaborated on the international

advantages of the metric system for the development of science and technology. This prompted Fulton to blurt out:

Why don't we just take a point and say that we in the United States will be on the metric system, and set the point far enough ahead in time that people can work toward it and prepare and then have this committee have legislation which takes that revolutionary step for the country and cuts the Gordian knot once and for all?

A few minutes later, when Chairman Brooks left the committee room and asked Hechler to preside, the latter quickly used the opportunity to observe:

I might say if the committee would care to foment a quiet revolution and adopt the metric system, the Chair would note we perhaps have a majority.

Six days after the hearing, on May 27, Chairman Brooks introduced H.R. 7401, to authorize the National Bureau of Standards to investigate and make recommendations on the practicability of adopting the metric system in the United States. Fulton went even farther on July 27, 1959, when he introduced House Concurrent Resolution 364:

That it is the sense of the Congress that the President of the United States should take the appropriate steps, with the counsel of the Nation's leading educators and scientists, to effect the adoption of the metric system of weights and measures as the Nation's official system of measurement in all appropriate fields of endeavor, and direct that all departments and agencies of the United States (particularly those having functions related to education or schools) foster and promote the understanding and use of such system by all the people of the United States.

Although neither received any further action, the Brooks bill and the Fulton resolution did stimulate additional discussion of the issue.

ENDORSEMENT OF METRIC SYSTEM BY PANEL—1961

During the second meeting of the Panel on Science and Technology on June 2, 1960, Fulton mentioned that both Chairman Brooks and he himself had introduced legislation "for the orderly adoption of the metric system in all fields in the United States." Once more, at the third meeting of the Panel on March 3, 1961, Fulton again raised the question, and received a chorus of affirmatives from the scientists serving as guest panelists. Chairman Brooks then put the question to the Panel:

How many of you agree that we should try to have the metric system adopted in this country?

There was another chorus of unanimous approval from the Panel, as each panelist responded: "I do."

The first metric bill of the 87th Congress was introduced on January 3, 1961, by Representative James Roosevelt (Democrat of California), eldest son of President Franklin D. Roosevelt. Roosevelt's

bill was similar to the Brooks bill of the prior Congress, except that the study was to be done by the Secretary of Commerce instead of the National Bureau of Standards. Roosevelt's bill, H.R. 269, was followed by Congressman Miller's, H.R. 2049. Miller was joined the same day by Fulton with House Concurrent Resolution 44 which duplicated the Fulton resolution of 1959. Miller's bill was identical with the bill Chairman Brooks had sponsored in 1959, authorizing a study to be made by the National Bureau of Standards.

Miller gradually emerged as the chief spokesman for the metric system, supporting a study as the technique to move toward future adoption of the system. He argued that as a World War I soldier in France the doughboys were exposed to the logic of the system, as well as the necessity of getting used to the 37-, 75-, and 155-millimeter guns and being guided by kilometers on the road signs throughout the countryside. Miller loved to tell the story of the head of an engineering firm in Alameda, Calif., who used to berate him for "monkeying around with this metric system" and who later did a 180-degree reversal and asked one day:

When in the hell are you going to get the metric system adopted?

When Miller kidded him for changing his mind, the same man confessed that he had a contract with an Amsterdam concern to design a huge crane and it cost him \$40,000 to redraw the plans into metric terms in order to fill the contract.

During June and July of 1961, Miller, who was then the chairman of "Subcommittee No. 1," held the first hearings on the metric system. The widespread use of metric measurements by the pharmaceutical and film industries; the demands of space-age industry for greater precision of measurement; the stimulus for international trade, with over 90 percent of the world's population using the metric system—all these factors spurred a renewed interest in persuading the United States to join the rest of the world's simplified measuring system. The committee agreed that a study was a necessary prerequisite to any action, which would otherwise be considered as too precipitous.

COMMITTEE MEMBERS TAKE SIDES

Miller, Fulton, and Mosher spoke out for the metric system. Mosher observed:

My inclination is to agree with what evidently all of us believe, that the metric system should be adopted.

Fulton wanted to move faster, by directing the President to enlist the aid of educators, scientists, and others to implement a plan

to convert to the metric system over a specific period of time. Hechler wanted to move somewhat slower, and he added:

I think we have to take this out of the long-haired field and get it into the stream of public thinking. * * * What disturbs me about this is that it seems to me in order for any progress to be made toward adoption of the metric system, there is going to have to be widespread public discussion, widespread public interest, not simply the interest, if you will pardon the phrase, of the "long hairs."

Outright opposition was expressed by Chenoweth, who asked:

Don't you think we should retain something in this country that makes us distinctive or sets us apart? We shouldn't adopt everything else that the world has. We ought to keep some identity.

On July 21, 1961, the full committee met to mark up the legislation, and Miller reported out his own bill which the committee unanimously adopted. In his report advocating passage of the study, Miller argued:

Technically speaking, the metric system is more simple to use than the system of English units for the reason that it is decimal and therefore requires little or no translation. * * * Today there is renewed interest in the proposition for a change to the metric system, despite the fact that for nearly three decades there has been a period of relative inactivity in this field. This renewed interest in conversion to the metric system is due, at least in part, to international competition in trade and to an ever closer contact with countries using the metric system.

However, the bill ran into trouble on the House floor. The leadership did not want to go before the Committee on Rules, because of the strong opposition of Rules Committee Chairman Howard W. Smith (Democrat of Virginia), and felt that to bring the bill up under suspension of the rules (requiring a two-thirds majority) was perhaps too formal a move for a simple study. So the bill was placed on the consent calendar. On nine different occasions between August 7, 1961, and April 2, 1962, the metric study bill was "passed over without prejudice," and still the leadership tried to slip it through on the "consent calendar"—where one objection would kill it. Two final attempts were made in 1962—on April 16, when three Members objected: H. R. Gross (Republican of Iowa), Durward Hall (Republican of Missouri), and Gerald R. Ford (Republican of Michigan); and May 7, when Gross again objected, killing the bill for the session.

H. R. GROSS OPPOSES METRIC—1962

Gross explained that he felt that authorizing \$500,000 would be a waste of money. He added:

It is wholly unnecessary to study the metric system. It is in use in a number of foreign countries. If it is desired to put the metric system into effect in this country let us legislate to put it into effect. Let us not waste a half a million dollars of taxpayers' money studying something to which there is no mystery whatever.

After he became chairman in September 1961, Miller bided his time and tried to encourage more educational work on the part of

proponents of the metric system before he brought it up again on the House floor. In the 1963-64 88th Congress, Miller and Roosevelt were joined by Representative Robert McClory (Republican of Illinois) in sponsoring similar bills, but in that period none advanced beyond receiving favorable reports from the Department of Commerce.

In 1965, with the opening of the 89th Congress, Miller decided to start a new drive to get the study legislation enacted. He reintroduced his study bill, and Fulton dropped a duplicate of his concurrent resolution into the hopper. This time the interest of non-committee members rose slightly as three Congressmen introduced metric study bills: McClory, Roosevelt, and Representative Albert H. Quie (Republican of Minnesota.) Miller used a new ploy in 1965. He asked the Legislative Reference Service of the Library of Congress on May 19 to analyze the advantages and disadvantages of the metric system, the extent of its current use in the United States, and the cost factors in those countries which had recently converted to the metric system. The analysis was forwarded to the committee on July 19 and published as a committee print entitled "Notes on Conversion to the Metric System." The questions were adequately answered, with the exception of the cost factors, on which data were simply not available.



Strong supporters of the metric system. At many meetings of the committee's Panel on Science and Technology, support for the metric system was voiced. From left, Lady Jackson (Barbara Ward), Chairman Miller, Representative Daddario, Dr. H. Guyford Stever, Director of the National Science Foundation, Representative Fulton, Dr. O. M. Solandt, chairman of the Science Council of Canada, and Representative Mosher.

The LRS study summarized the advantages as follows: Simplicity, ease of learning, logic, savings through faster calculations by engineers and scientists, precision and efficiency, expansion of trade with metric nations, the fact that the United States is virtually alone among nations holding out, and that certain sectors such as the pharmaceutical industry, geodesy, ball bearings and spark plugs, some segments of the military, and our Olympic teams—are already on metric. Disadvantages were summarized as cost of conversion, inconvenience of breaking old habit patterns, work and time necessary to learn a new system, confusion of the transition period when double use of the two systems would be necessary, and outdating of many signs, measurements, and documentary deeds.

CHAIRMAN MILLER LEADS THE FIGHT—1965

I have some aversion
To metric conversion
Though it's sound from the scientist view
But describing a dame
Won't be the same
If she's 96-61-92

In opening hearings on his study bill in August 1965, Chairman Miller mentioned most standard arguments, but seemed to come down stronger on the advantages:

The metric system is the unique and universal language of science and technology, even in the United States, which has become the most powerful nation in the world precisely because it excels all others in science and technology. It seems to me, therefore, quite paradoxical that we lead the small minority of nations who have yet to utilize the metric system. * * * The time has come when the Congress should authorize and direct an exhaustive study to arrive at recommendations upon which congressional decisions can be based. This question must be examined in every minute detail and aspect.

The responsibility of the Committee on Science and Astronautics in this matter toward the future strength and vigor of our country is indeed a profound one.

One by one, committee members endorsed the study—even those like Waggonner who was negative on the metric system itself. Representative Lester L. Wolff (Democrat of New York) brought up a new argument which in later years was frequently repeated—that since eventual conversion to the metric system appeared inevitable, it would be more advisable to “lend direction to this, rather than letting us drift into this system.”

In the 1965 hearings, Fulton renewed his efforts to speed up the process through making the decision to convert first, and then using

the study as a means to decide how to speed up the process of conversion. Fulton asked:

Why not have the Congress determine, after hearings, that we should make it the policy of the United States converting to the metric system over a period of time, and then have studies on the methods in the various industries on how to go about it?

An overwhelming majority of the committee disagreed with Fulton, and preferred the more cautious approach of, as the Miller bill stated, authorizing a study "to appraise the desirability and practicability of increasing the use of metric weights and measures in the United States." Instead of the Bureau of Standards, the Secretary of Commerce was authorized to study the costs and benefits of alternative courses of action, and report within three years. The change was made at the suggestion of the Commerce Department, to allow a broader study.

WYDLER COOL TOWARD METRIC

The full committee reported the bill out favorably, but Wydler by his questions and observations in the hearings indicated a negative feeling toward it. On August 4, Wydler and Chairman Miller had this exchange:

Mr. WYDLER. I was interested in this discussion today, particularly how this change would affect foreign trade. It appears to me there are two sides to that coin. * * * It must be difficult for those countries that have the metric system to compete with our own industry in our own country. Our home industries have a built-in-advantage.

Chairman MILLER. But can we maintain our industry at the present level if we do not convert?

Mr. WYDLER. This is something you have to put on the other side of the scale.

Chairman MILLER. That is right, if you want to make yourself a little island. * * *

In its report on the bill, the committee concluded:

It would seem certain that the United States will be using the metric system some day. The overwhelming forces of simplicity, ease of communication, and plain commonsense will force us to adopt it. The questions concerning the adoption of such a system are simply, "When?", "How?", and "To what extent?" These are questions that can be answered only by the serious study that this legislation calls for.

Appending "Additional Views" to the committee report, Fulton once again argued:

If the U.S. Congress and the President approve the immediate policy of adopting the metric system, then our schools and educational system can now begin working and readying. * * * We must begin immediately to lay an adequately broad base for the changeover with ease, not to postpone this essential change for a total of 15 years with further studies.

The sentiment in the committee was bolstered by the fact that in 1965, Great Britain decided to convert to the metric system over a 10-year period.

JUDGE SMITH AND THE LITTLE RED SCHOOLHOUSE

On September 9, 1965, Chairman Miller appeared before the House Committee on Rules in an attempt to get clearance for a special resolution on the metric study. Those were the days when the Rules Committee members sat around a long, green-felt-covered table, the Republicans with their backs to the windows, and the Democrats on the other side of the table with their backs to the door. Far at the end of one narrow side of the table sat its 82-year-old chairman, Judge Howard W. Smith, peering from under his shaggy eyebrows at the witness at the opposite end of the table.

Miller presented his case in a light and conversational tone, regaling the Rules Committee with historical background, such as the fact that the "yard" constituted the distance from King Edgar's nose to the tip of his fingers, and the "inch" was Charlemagne's thumb. Finally, Judge Smith pronounced his death sentence on what he called the "mee-tric" bill:

I got my education in a one-room red schoolhouse. We took our degrees in the three R's. Just to make an honest confession, I don't know what the metric system is.

Miller tried hard to recover some lost ground. He mentioned that Gina Lollobrigida's measurements would become 93-71-89.

Judge Smith seemed unimpressed: "Are you talking about meters or inches?"

"Centimeters," Miller responded.

Representative H. Allen Smith (Republican of California) then added:

Is that one of the fields the Committee on Science and Astronautics is studying? No wonder so many members are trying to get on that committee.

Needless to say, the Rules Committee acted unfavorably on the metric study bill in 1965, denying the House a chance to debate it on the floor under procedures allowing a majority vote for passage.

SENATOR PELL LEADS SENATE FIGHT—1966

Meanwhile, the U.S. Senate was acting along parallel lines, thanks to the leadership of Senator Claiborne Pell (Democrat of Rhode Island). Early in 1966, the Committee on Science and Astronautics took up a metric study bill which had been passed by the Senate, and had a one-day hearing on January 18, 1966. Since it was now apparent that Committee Chairman Howard W. Smith had enough

fellow Rules Committee members to block the bill, Chairman Miller hoped by agreeing to the Senate bill that the House could bypass the House Rules Committee.

SCIENCE COMMITTEE EFFORT

At the first committee meeting in 1966, Chairman Miller called up the Senate bill and asked Dr. J. Herbert Hollomon, Assistant Secretary of Commerce for Science and Technology, to testify. The Senate bill differed from previous bills in that it directed "appropriate participation by representatives of United States industry, science, engineering, and labor, and their associations, in the planning and conduct" of the study to be made by the Secretary of Commerce. This to some extent allayed the fears of those who contended that the study would be prejudiced by metric advocates who had already made up their minds.

Wydler, who opposed the immediate start of the study, had these exchanges with Dr. Hollomon:

Mr. WYDLER. I just wanted to ask, is this \$500,000 we are talking about in the President's budget?

Dr. HOLLOMON. Not that I know of.

Mr. WYDLER. But would it be possible to defer action on the bill? * * * Is there some specific reason that 1966 would be a more appropriate year than 1967?

Dr. HOLLOMON. My own view of the matter is that this is a subject of such importance that, to lay the facts and analysis on the table for the consideration of the Congress, the study is overdue. I know this committee has been struggling with this problem for some years. It is my view that the study is overdue and that we need the facts as promptly as we can lay them before the public.

The committee's majority report in 1966 stated:

The committee feels that study is a prime requirement before one of several, or a combination of several recommendations might be accepted. Among other purposes, the study would evaluate such courses of action as a compulsory adoption of the metric system, or a voluntary conversion by extending metric system usage to industries other than those currently using the same, or a regulated partial conversion in various industrial areas over an extended period of time.

The committee feels that a thorough understanding of the ramifications of the use of the metric system has long been neglected and that the study should no longer be delayed.

WYDLER ASKS HOUSE TO DEFER ACTION

Wydler, in appending "Additional Views," included the following observations:

In my view, the proposed metric study should not be started while the American economy is on a wartime basis.

The President has not budgeted any sums for this study and the Congress would be adding this sum to current spending if it were to authorize and appropriate \$500,000

this year. While the sum is relatively small, such items have a cumulative effect which is significant.

Although I believe the study is justified, its relative priority is low and I do not believe there is any important reason that it must be started while our Nation is engaged in a costly war in southeast Asia.

Those who argue that it cannot be delayed assume that the study will result in a major changeover to the metric system. I am not presently inclined to favor such a changeover, although I do support a study to obtain full information on the proposal.

The committee ran into the same buzzsaw of opposition from the Rules Committee in 1966. Senator Pell chafed at the delay, lobbying several committee members in an effort to get his bill moving. But the votes simply were not there and the leadership felt the study bill could not possibly muster a two-thirds majority under the "suspension of rules" procedure which bypassed the Rules Committee.

After six years without success, Chairman Miller patiently and doggedly tried again in the new 90th Congress in 1967. At the very first meeting of the new committee on February 21, 1967, he quickly brought up the study bill with this comment:

This bill was introduced toward the end of the last session of Congress and got tied up in the Rules Committee. I think it has been thoroughly heard. Do I hear a motion?

The debate was predictable. Chairman Miller observed:

Going on the metric system is not a simple matter. It will take perhaps a generation to get its full acceptance. * * * If we are going to successfully do business with countries that are on the metric system we have to use a common standard of measurements. * * * Part of the reason for the study is to, first, make sure that it is economically feasible to do this—many of us feel that it is, but I would like to have confirmation that it is—and secondly, to give the people an opportunity, to start educating them in this new field.

Fulton again brought up his concurrent resolution to make the decision first and study how to implement that decision. Miller's answer was that "the gentleman never formally asked for a hearing on the resolution." Waggoner wanted to be sure the bill did not authorize anybody to enforce the use of the metric system, and Wydler asked to include minority views in the report.

Wydler expressed the same objections that he had in 1966, adding:

I, therefore, support the authorization with the reservation that no money be spent on this proposal until world conditions improve and budgeting problems decrease.

Rules Committee Chairman Howard W. Smith, that implacable foe of the metric system, had been defeated in Virginia's Democratic primary in 1966 in a surprise upset. This paved the way for the Science Committee to get its metric study bill through the Rules Committee in time for consideration by the 90th Congress. On June 24, 1968, the House leadership scheduled the bill for action.

THE HOUSE FINALLY DEBATES METRIC—1968

Representative B. F. Sisk (Democrat of California), who had served on the Science Committee during its first two years and also on the select committee which preceded it, handled the resolution on the metric bill. He ran into flak from two Republican members of the Committee on Rules—John B. Anderson of Illinois and Dave Martin of Nebraska. Both men had opposed granting the rule, and fought it, joining Gross in their criticism of both the rule and the bill. Anderson observed that "from a budgetary standpoint" it was "a peculiar time for this Congress to launch a program which has literally been kicking around since the time of George Washington." Anderson said that the cost of converting the fastener industry in his district would amount to \$600 million, and that machine tool conversion might reach \$15 billion. Martin expressed this fear:

Just as surely as night follows day if this legislation is approved by the Congress to set up this 3-year study of the program we are going to have a report from the Department of Commerce that it be mandatory, perhaps over a period of 10 years, such as England is doing.

Gross sniped at the resolution as useless, since he contended there was nothing more the Commerce Department or Bureau of Standards could supply:

I suspect that the Bureau of Standards has forgotten more about this than most people know. * * * I cannot think of any way by which the House of Representatives could waste its time by even going into the Committee of the Whole House on the State of the Union to debate this bill. It ought to be turned down out of hand.

Gross kept pecking away at the bill, until Fulton smilingly told him:

I congratulate the gentleman because when he is speaking, he is using the metric system of currency, which our forefathers were smart enough to adopt.

Stopped in his tracks, Gross responded:

Then God help us, because nobody else will.

During the debate on the rule, several Republican Members spoke out strongly in support of both the rule and the bill, including Representatives McClory, Jerry L. Pettis of California (a member of the Science Committee), Edward J. Derwinski of Illinois, and Craig Hosmer of California. Pettis told his colleagues:

We seem to be living with a strange paradox in our society. We cling to an archaic set of measuring standards, almost as a child would cling to a security blanket. * * * There are very powerful interests in our country which stubbornly resist the change to the metric system. In their shortsightedness they foresee the need for tremendous expenditures and loss of income as a result. I am sure that as time goes on, as the years go by, the private interests are going to find that they will pay for

their myopia many times beyond the cost of change in loss of business, in being excluded from new markets, and will find themselves with a very burdensome inventory of increasingly outmoded capital investments.

CHAIRMAN MILLER AS FLOOR LEADER

The resolution went through on a voice vote, and the Committee of the Whole proceeded to debate the bill itself. In his leadoff remarks, Chairman Miller indicated that since the first metric bill of Representative Overton Brooks had been referred to the Science Committee in 1959, Great Britain had started its 10-year conversion process and 14 other countries had converted to metric. When asked whether Congress should authorize the study in the light of the deficit and need to reduce expenditures, Miller responded:

Of course, I may be wrong, but I have been around this game of politics for a little more than 30 years. I was first elected to the California Legislature approximately 30 years ago. In all this period I have never seen the time when the finances of the State or the Nation were ever just right to initiate any new thing.

Miller added that the 67,000-member National Society of Professional Engineers, plus many scientific organizations and individuals had petitioned their support of the legislation. He read a letter from a schoolchild in Minnesota:

My schoolteacher tells me that you have a simple way of handling fractions called the metric system. Up with the metric system, down with the fractions.

Among other supporters who spoke out for the legislation were Conable (an alumnus of the committee), Ottinger (a future member of the committee who had also introduced a metric study bill), Fulton, Rumsfeld, Pelly, Roush, and Hechler. Roush lightened the debate by sparring with Gross, who kept bringing up facetious issues like the effect of the metric system on expressing the debt and deficit, or whether the fact that Monaco was on the metric system actually aided in assessing winnings from the gambling tables. Roush with mock seriousness bemoaned the effect of the metric system on literature, forcing the abandonment of the "Half a league onward" in the "Charge of the Light Brigade" as well as Robert Frost's "promises to keep and miles to go before I sleep."

Hechler sketched in the history of the metric system since Washington and Jefferson's time. He remarked that the United States should have adopted the metric system in the early years of the Republic. This prompted Representative Richard H. Ichord (Democrat of Missouri), an expert on internal security matters, to explain:

I think I can answer the question of the gentleman from West Virginia who stated that he could not understand why the United States did not adopt the metric system in the very beginning. I believe it was because the metric system was associated

with the French Revolution. It was adopted by the French along about the time of the French Revolution, and there was such a revulsion in America against the excesses of the French Revolution that our legislators did not adopt the recommendations of Thomas Jefferson.

Anderson, over Miller's opposition, succeeded in pushing through two amendments, one to study the feasibility of keeping our existing standard of measurement, and the second to require the Secretary of Commerce to make positive recommendations on how the cost increases of conversion to metric could be met in various areas. Fulton successfully sponsored an amendment to require that the study be made with existing funds. The bill then passed by the surprisingly strong majority of 269 to 42, and after clearing the Senate the legislation was signed by President Johnson on August 9, 1968.

TERMS OF THE 1968 METRIC STUDY LAW

As finally enacted, the 1968 legislation provided for—

a program of investigation, research and survey to determine the impact of increasing use of the metric system in the United States; to appraise the desirability and practicability of increasing the use of metric weights and measures in the United States; to study the feasibility of retaining and promoting by international use of dimensional and other engineering standards based on the customary measurement units of the United States; and to evaluate the costs and benefits of alternative courses of action which may be feasible for the United States.

In July 1971, the Secretary of Commerce transmitted to the Congress a 170-page report entitled "A Metric America—A Decision Whose Time Has Come." Dr. Lewis M. Branscomb, Director of the National Bureau of Standards, stated in sending the study supervised by Daniel V. De Simone (later Deputy Director of the Office of Technology Assessment) up to the Secretary of Commerce:

I am convinced that after nearly two hundred years of national debate on this issue, the time has come for a national decision on a positive course of action.

Among the recommendations of the Secretary of Commerce were these:

That the United States change to the International Metric System deliberately and carefully;

That this be done through a coordinated national program;

That the Congress assign the responsibility for guiding the change, and anticipating the kinds of special problems described in the report, to a central coordinating body responsive to all sectors of our society;

That the Congress, after deciding on a plan for the nation, establish a target date ten years ahead, by which time the U.S. will have become predominantly, though not exclusively, metric.

By the time the study was forwarded to Congress, only the following nations of the world had not converted to the metric system: Barbados,

Burma, Gambia, Ghana, Jamaica, Liberia, Muscat and Oman, Nauru, Sierra Leone, Southern Yemen, Tonga, Trinidad, and the United States. And the list was narrowing every year.

COMMITTEE BRIEFED ON STUDY REPORT

There once was a student named Peter
Who asked, "Why use meter and liter?"
But when he found out
He let out a shout:
"Cause meter and liter are neater!"

On September 14, 1971, Dr. Branscomb and Mr. De Simone briefed the committee on the study report. Chairman Miller noted that 102 years had elapsed between the 1866 law legalizing the metric system, and the 1968 law authorizing the study, adding:

In the event any further metric legislation is necessary, I hope that another 102 years won't elapse before it is passed.

Dr. Branscomb acknowledged at the outset:

It was your committee which took the initiative in asking that the study be made. It is fitting, therefore, that this should be the first hearing on the metric report.

Dr. Branscomb told the committee that as the study progressed it became apparent that the United States was already increasing its use of the metric system, albeit slowly, and that sooner or later the United States would become predominantly metric.

At the briefing, Miller asked Dr. Branscomb:

How was the period of 10 years arrived at? Is this something you pulled out of the hat or has it some sound basis?

Dr. Branscomb replied:

It is never a good time to do something that is inconvenient and will not be easy, but something regarding which the benefits are long-lasting. There is a specific reason why now—that is, in the next year or two—is the time this 10-year effort should begin. Indeed, it should have already begun, and that is based on the data contained in our report on the increase of activity in the international standards organization. If we wait ten years and then begin a metric change-over, there will at that time probably exist a full set of 10 or 15 thousand design practices and habits and convictions of all our competitors' technology. If we change to metric at that time, the meaning of the word change to metric will be change to international metric standards. Those standards will then embody our competitors' technology and we will bear the cost of the hardware changes.

At the 1971 briefing, several members of the committee expressed concerns. Chairman Miller was disappointed that draft legislation defining the recommendations in the report was not transmitted with the report. Dr. Branscomb indicated that there was a "variety of

alternatives" developed by the Department of Commerce. He told the committee:

The Department feels, and I think properly, that this is an issue on which we need a national consensus.

Fulton once again sparred with Dr. Branscomb on whether the Federal Government should show the way and establish a national policy by example, requiring every Federal agency to conform to the same system of measurement. Dr. Branscomb backed away from full endorsement of this concept, responding:

We do not believe that the citizen should be told by his government what measurement language will not be used. We will not exclude the right of a citizen to use pounds.

Hechler was concerned with the precise powers of the central coordinating body, and whether it would be "just a group that is going to be out in left field telling the American people what they have to do." Dr. Branscomb presented two alternatives: a national commission appointed by the President supported by Federal agencies, or a lead agency like the Department of Commerce, bolstered by a representative public advisory group. (The first alternative was eventually adopted.)

Mosher was disturbed that only 65 percent of the Federal civilian agencies indicated their support for a "coordinated national program," and Dr. Branscomb pointed out that the "Don't knows" had been grouped under the opposition. Miller and Cabell both expressed concern over spelling out the impact of conversion on small business.

IS METRICATION IN THE DICTIONARY?

When the Subcommittee on Science, Research and Development on September 23, 1971, heard testimony by Nathan Cohn, vice president of the precision instruments firm of Leeds & Northrup, Fulton chided Cohn as well as "scientists at the Bureau of Standards" for using the word "metrication." Fulton said he could not find the word in his dictionary, nor could he find the word "metrification," adding:

I expect the witness to write to Webster's Dictionary, and the Director of the Bureau of Standards to do likewise.

Dr. Branscomb responded:

We continue to be impressed by Mr. Fulton's erudition. We have tried to avoid having to confront the fine distinction between those two words by avoiding the use of both. I believe if you read our report carefully you will find Mr. De Simone insisted on the rather more earthy, if rather less intellectual, phrase "go metric".*** The head of the British Metrication Board distinguishes the use of those two words by noting in Britain the word is "metrication" because there is no "if" about whether Britain is going metric.

In October 1971, the Science Committee published as a committee print the study entitled "A Metric America", noting "the interest in the report, and particularly the nationwide recommendations contained therein."

The year 1972 was a relative inactive one for the progress toward the metric system in the Science Committee. It was an election year. The No. 1 cheerleader for the metric system, George P. Miller, introduced a conversion bill in March, but in June he went down to defeat in the California primary and nothing further was done that year. The National Aeronautics and Space Administration, which had decreed in 1970 that its policy was henceforth to utilize metric symbols in its work, reported a highly successful response. With space exploration becoming an international venture, along with the multinational scientific work in which the United States collaborated, this was a natural development for the agency authorized by the Science Committee. But while Senator Pell was steering a 10-year metric conversion bill through the Senate in 1972, the Miller bill died without any House action as the 92d Congress drew to a close at the end of 1972. Also, more and more ominous rumblings of opposition began to be heard from organized labor and small business, concerned about conversion costs.

SMALL BUSINESS OPPOSITION

In 1972, the House Select Committee on Small Business issued a report, based on hearings in June 1971, suggesting that the metric system would produce long-range advantages to U.S. industry and business, but could inflict financial hardships on the small business community. The Small Business Committee report concluded:

The subcommittee finds that although there is an increasing use of the metric system by many large business concerns, small businessmen appear to use this system to a far lesser degree. This would indicate that small firms are likely to encounter more difficulties in converting to metrics than is the case with big business. The subcommittee therefore concludes that the small business sector of the economy would need affirmative and meaningful assistance in metrication.

Numerous bills providing Federal subsidies to small business to convert to the metric system were introduced in both the House and Senate, putting pressure on the Science Committee to do likewise.

At the beginning of 1973, there was a renewed interest in the Science Committee and the rest of Congress in carrying out the recommendations of the Commerce Department's metric report. At the same time Senator Pell was gearing up to get some version of a metric bill passed again in the Senate, a number of bills were introduced in the House. Among the Science Committee members who introduced metric conversion bills in 1973 were Teague, Mosher, Hechler, Davis,

Bell, and Fuqua. Even before he was formally named as the new chairman of the full committee, Teague dropped in his metric bill on the first day of the new Congress—on January 3, 1973, at which time he issued the following statement:

The conversion to the metric system is of sufficient importance so that I expect it to receive early consideration by the committee. The bill which I have introduced is essentially the same as that which was passed by the Senate during the last Congress. Additional hearings by the Committee on Science and Astronautics may cause modifications; however, the United States is one of the last nations to remain on the old system of measures and it is important for our economy that in this area we catch up with the times.

At the committee's organization meeting, on February 26, 1973, Chairman Teague indicated that he planned to hire former Chairman Miller as a consultant on the metric bill for a few months. The burden of staff work in the metric area, which had been ably carried by committee chief clerk and counsel John A. Carstarphen, Jr., since 1959, was gradually taken over by Dr. John D. Holmfeld, as the emphysema which eventually caused Carstarphen's death progressively weakened his physical strength.



Representative John W. Davis (Democrat of Georgia), left, on an inspection tour of NASA's Langley Research Center with Lud Andolsek, U.S. Civil Service Commission and Representative Don Fuqua (Democrat of Florida.) At right is Dr. Richard Heldenfels of Langley.

REPRESENTATIVE JOHN W. DAVIS AND THE METRIC BILL

Chairman Teague referred the metric legislation to the Subcommittee on Science, Research and Development, chaired by Representative John W. Davis (Democrat of Georgia). A short and stocky man with a warm personality and ready smile, Davis was best known for the informal way with which he could clarify for his colleagues very complex scientific issues. He always seemed able to relate current committee issues to his rich experience as an amateur astronomer, accomplished airplane pilot, practicing lawyer, solicitor, and judge. Davis represented a difficult northwest Georgia district which stretched from the suburbs of Atlanta to the suburbs of Chattanooga, Tenn. He had the headquarters of Lockheed Aircraft Corp., the largest employer in his district at Marietta, Ga., as well as the industrial and textile city of Rome, where he was born and had practiced law. Elected to the House of Representatives in 1960, Davis moved easily into the chairmanship of the original Daddario subcommittee when Daddario left Congress in 1971. In 1974, he was defeated in the Democratic primary by Representative Lawrence P. McDonald, a 39-year-old member of the John Birch Society.

In opening the metric hearings on March 19, 1973, Chairman Davis stated:

The question before us in these hearings is whether our Government should now take the necessary steps to bring about a gradual and orderly changeover to the metric system. I think the real question can be stated this way. We are going to have to make a change and the question is whether it will be orderly and gradual or just how it will be made.

Representative J. J. Pickle (Democrat of Texas), a member of the subcommittee, and Congressman McClory, both testified as cosponsors of metric conversion legislation. Pickle and McClory, while rejecting subsidies, advocated a clear-cut decision by the administration that complete metric conversion would take place by the target date of 10 years hence—even though the conversion would not be accompanied by involuntary sanctions. The administration rejected subsidies contained in legislation introduced by Senator Pell and by Congressman Fuqua. Pickle observed that the administration attitude sounded like a "hands-off policy." Fuqua and Symington questioned NBS Director Dr. Richard W. Roberts on what incentive there was for small businessmen to convert, and how they would be protected against losses of conversion, but Dr. Roberts stood firm against using the "carrot and the stick."

Symington, with his customary twinkle in the eye, asked:

Do you have a target date in your mind or in the Commerce Department? Do you feel that you understand rather well when this beautiful moment will arrive and we will be metric?

Dr. Roberts dodged the question by stating:

I think what you are going to have is a distribution of times.

On the other hand, not all committee members accepted the firm selection of the date of January 1, 1984, proposed in the McClory-Pickle bill. Mosher, a metric advocate, nevertheless warned that 1984 as a target had an "Orwellian" ring to it and "would just increase popular resistance and derision."

LABOR INSISTS ON TOOL SUBSIDY

On March 20, Kenneth T. Peterson, legislative representative of the AFL-CIO, threw a bombshell with a strong statement that:

Any legislation dealing with metric conversion must provide compensation and adjustment assistance to workers for the cost of tools, the costs of education and retraining, and other conversion transition costs, including relocation, job loss, downgrading, and loss of income or promotion opportunities as a result of workers' lack of familiarity with the metric system.

Peterson also asked for a restudy, on the grounds that the Commerce study did not adequately consider the problems of the workingman. To this, Mosher observed that he hated to see the progressive AFL-CIO "in the position of the people who resisted the steam engine, or steamboat when it came, or resisted the airplane."

Among other witnesses were John P. Roche, president of the American Iron and Steel Institute, who opposed conversion as planned in the legislation because of the cost, and Lord Ritchie-Calder, former chairman of the British Metrication Board.

You could count on Representative H. R. Gross (Republican of Iowa) to come out fighting whenever any metric bill showed its head, and that's exactly what he did when he testified before the Science Committee on May 10, 1973. Gross told the committee that he had had the General Accounting Office evaluate the Commerce Department's report, and that the GAO had "confirmed my fears that the report was biased," on several grounds: that conversion would dramatically increase imports; that the "tremendous costs" of conversion would increase prices for American consumers; and that a 10-year conversion plan would cost far more than a voluntary, no-time limit plan.

Chairman Davis expressed agreement with Gross that any conversion should be voluntary and without Federal subsidy. Immediately following Gross, Dr. Roberts, the National Bureau of Standards Director, returned to refute the GAO letter. He put the emphasis on the "significant barrier to the export of our products if U.S. industry remains out of step with respect to measurement practices." He contended that the original report included an adequate sampling of small

businesses, and that the GAO cost figures were exaggerated. He did concede that the GAO was probably correct in adding interest charges, but claimed the additional cost was not excessive.

Considerable disagreement within the committee followed conclusion of the spring hearings in 1973. "Metric hawks" like Representative Pickle softened their hard-line insistence on a firm approach, by urging that more practical considerations should accompany the conversion. "We are not going to throw the farmer in jail if he speaks of his 'back 40 acres,'" Pickle stated. Organized labor and small business, on the other hand, stepped up their campaign against any legislation which did not contain subsidies, or which smacked of a determined or mandatory conversion. Events seemed to favor the advocates of the legislation, as General Motors Corp. announced it would switch to the metric system for all its new products, Ford revealed that its Pinto engine would have metric measurements, and the U.S. Geological Survey and National Park Service announced that metric measurements would be added to maps and national park signs. Ohio began sporting kilometers in addition to miles along interstate highways, and the Cincinnati Reds informed spectators of the number of meters from home plate to the bleachers. The nationwide discussion had its effects within Congress, as 57 Members of the House either sponsored or cosponsored metric bills of various sorts in 1973.

MARKING UP THE METRIC BILL—1973

On September 20, the Davis subcommittee had a two-hour markup session, with extended debate on the timing of a metric conversion plan to be prepared by a 21-member National Metric Conversion Board, and on the role of the President and Congress in approving or vetoing the plan. The subcommittee recommended that within 12 months the Board should prepare a conversion plan to be transmitted to the President and Congress for review. Fuqua added a provision in the committee report that the Board consult with and cooperate fully with officials of the educational system, and Esch expressed the view that cooperation by numerous industries not be considered in violation of antitrust laws. The Department of Justice and House Judiciary Committee both felt the reference to antitrust laws should be dropped, and they were deleted from the bill. But at Esch's suggestion the bill required the Board to publicize the results of industry conferences and agreements.

Between the subcommittee markup and the full committee markup a number of caucuses and conferences were held to meet suggestions and objections. Teague finally decided to introduce a clean bill incorporating many of these suggestions, especially the inclusion of the word

"voluntary" at several points. At a 90-minute markup session on October 16, the full committee decided to strengthen the role of Congress by allowing disapproval of the Board plan if Congress passed a concurrent resolution (not subject to Presidential veto.) The latter decision incurred the opposition of Representative Stanford E. Parrish (Republican of Virginia), who issued "Additional Views" spelling out his preference for a joint resolution which would allow a Presidential veto.

In the full committee markup, the strongest support for the bill was expressed by Teague, Mosher, Davis, Symington, Fuqua, Hechler, Pickle, Bell, Esch, and McCormack. Rather than mandating a 10-year "program" of conversion to the metric system, the 1973 bill provided that it was the "policy" of the United States to convert on a voluntary basis over 10 years. Davis frankly explained he felt this would make it easier to get the bill through the Congress. The bill was reported by unanimous voice vote.

LABOR SWAYS THE RULES COMMITTEE

On October 25, 1973, the Science Committee made an unsuccessful attempt to get Rules Committee clearance for the metric conversion bill. Most observers agreed that the opposition of the AFL-CIO swung several members of the Rules Committee against the bill, and a rule was refused.

In a 4-page, detailed letter to the Director of the AFL-CIO Legislative Department, Andrew J. Biemiller, Davis meticulously explained the many ways in which the Science Committee had changed the metric bill to accommodate labor's objections and recommendations. Davis underlined the fact that in response to labor's suggestions, the principle of voluntarism had been liberally sprinkled throughout the bill. He pointed out that the AFL-CIO suggestion that representation be expanded to specify "labor" and "consumers" had been adopted. But on key points, such as the labor suggestion that the conversion period be 15 years instead of 10, and that reimbursement be made by the Federal Government to workers for newly acquired metric tools, Davis stood firm. On the tools issue, Davis decried the concept of "a Government inspector in every tool kit." He added that it would be inequitable not to reimburse aerospace and auto workers who had already acquired metric tools on their own. He pointed out that reimbursement "would violate the basic principle that 'costs shall lie where they fall' which would be applied in all other fields of metric conversion." Finally, Davis indicated "the very real fact that the administration opposes such a provision."

Despite the care with which Davis explained the changes which had been made to meet labor's objections, the olive branch was rejected by the AFL-CIO, which continued to mount a more vigorous campaign against the legislation. Labor felt very strongly that the promises of relief for plants and industrial workers thrown out of work by foreign, low-wage-nation imports had proven to be empty in practice.

Teague, Davis, Hechler, Bell, and McClory testified before the Rules Committee, but the atmosphere was hostile. On the Republican side, an old antagonist, Dave Martin of Nebraska, led the fight against the bill, and on the Democratic side, Claude Pepper of Florida spoke out in opposition. Martin said it would cost millions of dollars to recalibrate scales and change gasoline pumps to the metric system. He charged:

You say it is voluntary, but in a few years you will come back with another bill that it is going to be mandatory.

Pepper said during the Rules Committee hearing:

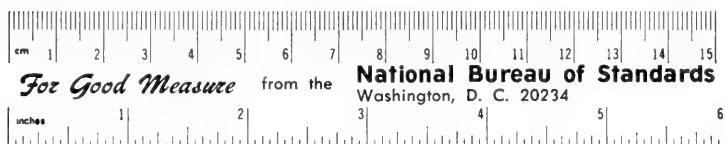
I have been approached by some of the labor representatives * * *. They felt that many of the working people, particularly skilled people, would have to learn a new system and maybe would be unemployed if they didn't learn it adequately. They would also have to change their tools.

LABOR AND RIGHTWING OPPOSITION TO METRIC SYSTEM

An unlikely coalition began to develop between labor and right-wing groups opposed to metric. Representative John R. Rarick (Democrat of Louisiana) best expressed the view of the latter when he described the change as "about as simple as abolishing the English language" and teaching Americans "to reeducate themselves in a foreign tongue."

Chairman Teague decided to make another run at the Rules Committee. On January 24, 1974, he appealed to the Rules Committee Chairman, Ray J. Madden (Democrat of Indiana), in a persuasive three-page letter. Teague pointed out that much more support was building in the scientific community. The school systems in California, Maryland, and Michigan were moving to teach the metric system, and additional support was mounting among American industries. But Chairman Madden was a friend of labor and labor remained generally opposed. The Committee on Rules surprised the Science Committee by voting an open rule and specifically making in order an amendment by Representative Spark M. Matsunaga (Democrat of Hawaii) to subsidize workers for the purchase of tools, an amendment which otherwise might have been ruled not germane.

As Chairman of the Veterans' Affairs Committee, Teague was accustomed to winning victories for his legislation by big margins. Increasingly in his latter years as Chairman of the Science Committee, he decided to bite the bullet on issues where there was powerful opposition but where he felt the committee was on the right track. This prompted Chairman Teague on April 24, 1974 to ask Speaker Albert to take up the metric conversion bill at the first opportunity, under "suspension of the rules" procedure requiring a two-thirds majority. Teague was strongly opposed to a Federal subsidy for tools and the Matsunaga amendment. In the two weeks prior to consideration of the bill by the House on May 7, the lobbying and jockeying for position was intense. Not long before the House debate opened, Teague was given a very simple and attractive metric ruler fashioned by the National Bureau of Standards. The ruler was marked "For Good Measure", and it made the metric system look very easy and clear. So Teague picked up the phone and called Secretary of Commerce Frederick B. Dent to ask him to furnish 500 rulers to send out with a "Dear Colleague" letter which he was preparing jointly with Mosher. The rulers made quite a hit, even though they did not succeed in swinging enough votes for the legislation.



Small plastic rulers, simplifying small metric measurements, which Chairman Teague distributed to every Member of the House of Representatives prior to the debate on the metric bill in 1974.

The Teague-Mosher letter listed recent movements in American industries and the school system toward the metric system and argued:

All indications are that this trend will continue, although in an uncoordinated, uneconomical way, rather than through an orderly, efficient transition period. * * * The conversion to the Metric system under this bill would be *entirely voluntary*.

Again, on May 2, Teague and Mosher dispatched a "Dear Colleague" letter, enclosing an explanatory pamphlet prepared by the State of Ohio, and urging that the Board "can reduce the total conversion time and cost." Sending favorable letters to Members of the House were the American Institute of Architects, Transportation Association of America, and the National Education Association, while opposition letters were sent out by the United Brotherhood of Carpenters and Joiners of America and the International Brotherhood

of Electrical Workers. On May 3, Representative John Y. McCollister (Republican of Nebraska) circulated a letter which concluded:

In the interest of small business, I urge you to vote against the measure. McCollister also brought up the issue of a subsidy for tools, thereby winning the sympathy of labor opponents of the bill.

LABOR AND SMALL BUSINESS GANG UP

In the floor debate on May 7, Mosher vainly attempted to head off the opposition by labor and small business by pointing out, on the basis of information supplied by the Administrator of SBA, that small firms were eligible for economic disaster loans from the SBA. The bill received unexpected support from Representative John B. Anderson (Republican of Illinois), who had been against the original metric study act in 1968. Among committee members who spoke out for the bill in the floor debate, in addition to Teague and Mosher, were Bell Davis, Goldwater, Symington, and Hechler.

Teague displayed to the House a huge map prepared by the Bureau of Standards which showed how lonely the United States was as a nearly isolated island in a metric sea, joined only by a few obscure nations like Trinidad, Tobago, and Tonga. He stressed the voluntary nature of the bill, but gave the back of his hand to the subsidy issue:

We asked for an open rule, but we certainly did not expect the committee to give us a rule making in order amendments the committee had considered thoroughly and had voted down. The Rules Committee not only wanted to give us a rule but they also wanted to write a bill.

While Davis was speaking in support of the bill, Gross suddenly demanded that he convert two inches into metric terms "quick-like." Davis hesitated a little, answered "fifty millimeters", then backed up to explain: "Well, that is not precise, but is almost exact." Actually, Davis answered correctly, although his hesitation brought laughter from both sides, prompting the subcommittee chairman to say:

Mr. Speaker, I ask unanimous consent to proceed for such time as was consumed by laughter during the time the House was not in order.

DEFEAT IN 1974

The House roundly defeated the 1974 legislation, many Members voting against it because they objected to the procedure of bringing it up under suspension of the rules, allowing only 40 minutes of debate and barring any amendments. Requiring a two-thirds majority, the bill did not even get a simple majority as it lost by 240 to 153. Teague remarked after the vote that there had been abuses in tool-buying benefits for World War II veterans, and he did not want them repeated

in metric conversion. Among the committee members who voted against the bill were Parris, Conlan, Camp, Roe, and Brown of California.

Teague's uncompromising stand against tool subsidies won him a laudatory editorial in the *Wall Street Journal* of May 10, 1974, headlined: "Refusing To Give a Centimeter." The editorial stated in part:

Congressman Olin Teague of Texas deserves this week's heroism in defeat award for letting his own metric conversion bill sink without a trace rather than become another vessel for federal subsidies. *** Mr. Teague's sacrifice was to a higher cause, the integrity of the Federal Treasury.

Teague appreciated the editorial and had it reprinted in his June 1974 newsletter. He told his constituents that he was not giving up:

Although it was definitely defeated in the form I brought it to the floor of the House of Representatives, there are a few alternatives that may bring the bill up again before the year is out.

The metric conversion is certainly too important to let it slip by without some action by Congress. I am definitely going to try to pass this legislation in a way that will be most beneficial to the public and in a way that does not require any great expenditure of the taxpayer's dollars.

On June 10, a little over a month after the stunning defeat on the House floor, Teague assembled a bipartisan strategy group to mull over alternative courses of action. Getting together in room 2317 Rayburn, the small anteroom to the main committee room were Davis, Symington, Mosher, and Bell. They discussed whether to try and bring the bill up under the existing rule, which would make the tool and small business subsidy amendments in order; or to attempt to get a new rule; or to redraft the bill. The consensus was that it would be better to "let the metric bill lie for a while." In September, Teague asked the staff to rethink the issue. There was some sentiment favoring a possible move in a postelection session, but Teague finally concluded to cool it until the new Congress met in January.

THE METRIC CONVERSION ACT OF 1975

Farewell, Oh fragile Fahrenheit
 Who kept us warm each winter night
 The next to go may well be us
 So treat us kindly, Celsius

In 1975, the Science Committee finally succeeded in getting its metric conversion bill through the Congress. In the process, the committee had to buy support by throwing overboard some of its key provisions. A question remained whether the final legislation had many teeth left, or whether it was so watered down as to make coordinated movement toward the metric system much more than a millimeter at a time.

The new jurisdiction acquired at the beginning of the 94th Congress in 1975, as in 1959, spelled out that the Committee on Science and Technology under the House rules was accorded jurisdiction over the "Bureau of Standards, standardization of weights and measures, and the metric system."



For his role in introducing the metric legislation in 1975, Chairman Teague was honored with a cover story in the *American Metric Journal*. At right is Robert A. Hopkins, editor of the *Journal*.

As a first step, Teague urged the Subcommittee on Science, Research and Technology, now chaired by Symington, to hold complete hearings as early as possible in 1975. He also wrote a special letter to the *Parliamentarian*, asking that the metric bill introduced by Mosher and himself be given the number of H.R. 254 (there being 2.54 centimeters in an inch.) It was so done.

Symington opened two weeks of subcommittee hearings April 29, 1975, describing the bills to be considered as follows:

In January, Chairman Teague and Mr. Mosher introduced H.R. 254 which is identical to the committee's bill in the 93rd Congress. * * * Mr. Hechler introduced H.R. 492, which is similar in many aspects to H.R. 254. * * * H.R. 627 was introduced

by Mr. McClory. It provides that the sole official system of units would be the metric system. The administration bill, H.R. 6154 (introduced by Teague and 18 others, mainly committee members) is similar in many respects, but it does not specify a time frame. I recently introduced a metric bill, H.R. 6177, as a courtesy to reflect the view of the institutions of labor in the country. *** Mr. Fraser introduced H.R. 6264, which would direct the executive branch to convert to the metric system, and this bill also calls for assistance to individuals.

McClory and Representative Sam M. Gibbons (Democrat of Florida) led off the testimony, followed by a long parade of witnesses for and against various types of metric conversion.

Dr. Roberts of the Bureau of Standards reported to the committee a healthy list of Federal agency initiatives in the metric area, including the funding authorized by Congress for the Office of Education to help the school systems to teach metric measurements. The Education Amendments of 1974, enacted by the Congress and funded with about \$2 million annually, declared: "It is the policy of the United States to prepare students to use the metric system."

Symington and Fuqua quizzed Dr. Roberts closely about the administration's decision to abandon the 10-year timeframe. It proved to be one of the key turning points. Labor was delighted to learn it had a strong ally in the effort to drop the time limit, and the subcommittee seemed inclined to remove this sticking point.

LYOYD PLUGS FOR LABOR BILL

Representative Jim Lloyd (Democrat of California), a member of the subcommittee, made a strong statement to the subcommittee essentially endorsing the labor bill because of its subsidies to workers for tools. Lloyd presented his endorsement so forcefully that the AFL-CIO lead-off witness, Kenneth T. Peterson, turned to Lloyd and remarked: "Congratulations upon your great statement." Also nodding his pleased approval was Thomas Hannigan, Director of Research and Education at the International Brotherhood of Electrical Workers, who testified for the AFL-CIO with Peterson. Hannigan had been a voluble minority critic of the Commerce Department study as a member of the Metric System Study Advisory Panel.

The Symington subcommittee had more than an average interest in the labor testimony on April 30 because of labor's role in defeating the 1974 bill. Peterson attacked the assumption of the 1971 Commerce Department study, and most of the ensuing metric legislation, which advocated that "costs should lie where they fall" in metric conversion. The labor representatives, with their testimony and exhibits, filled 169 pages of the hearing record, indicating the thorough and meticulous fashion they approached an issue which they regarded as increasingly

critical. Symington observed that in Australia, with a 10-year deadline, "the labor movement, according to our information, supports their metrication, and they expect to wind up about two years ahead of the ten-year guideline that they set for themselves." Symington added this hooker:

Those are pretty tough unions in Australia, and I don't think they have any Australian sheep's wool pulled over their eyes in this.

Fuqua also noted that in both Great Britain and Australia, labor had not been adversely affected by the timed movement toward metrication, and the total cost had been less than expected. Fuqua added that a reasonable metric bill "will create more jobs and make the American-made goods more competitive in the world markets."

On May 1, 1975, Alexander S. (Pat) Tirrell, representative of the Canadian Labor Congress to the Canadian Metric Commission, testified:

Labor is not at all opposed to metric conversion in Canada. Labor, as a matter of fact, supports metric conversion and feels that under the circumstances, it's a definite, positive step in the right direction. * * * There is a tendency, Mr. Chairman and members of the committee, to overstate the difficulties that will confront working people as a consequence of metric conversion.

Tirrell also suggested that the provision in Symington's bill to subsidize those adversely affected by conversion was "just too flat and too broad" and should be handled by the Metric Board on specific investigation rather than being frozen into the concrete of legislative language.

SYMINGTON SUBCOMMITTEE MARKUP

At 8:15 on the morning of May 21, 1975, short of two weeks after the conclusion of the formal subcommittee hearings, Chairman Symington assembled his subcommittee for the crucial markup session in the main committee room in the Rayburn Building. Symington presented a redraft of the metric conversion bill in an attempt to meet "the anticipated objections or objectives." One of the most significant compromises the subcommittee made was to drop the 10-year time-frame. Why was this done? Symington explained it to his subcommittee this way:

We just didn't feel it necessary to fly the red shirt of a time frame.

He explained that there were reasons given by both those favoring a strong bill, and those in favor of a weak bill for this change:

If you put in ten years, some people might think it might take twelve. * * * It was our feeling, once the country is moving in that direction, that a momentum would be created which would establish its own pace. It will undoubtedly be well on its way, if not complete, in ten years.

Representative Jim Lloyd then offered an amendment to knock out the phrase "with a view to making metric units the predominant, although not exclusive, language of measurement." Lloyd laid it on the line in explaining his objective:

Well, what I am trying to do with this, in all fairness, is to make a direct appeal, a strong appeal to labor.

Symington was immediately sympathetic:

Maybe it is not necessary to incur what appears to be, perhaps, the open opposition of some sections or sectors of the economy, that is, simply for the sake of one word. * * * It would be nice to get the labor community behind the bill at the beginning.

McCormack asked for Symington to elaborate, and Symington responded that he felt the remaining language—"to plan and coordinate voluntary substitution of metric measurement units for customary measurement units"—was "sufficiently strong to push us off the diving board into metric."

EMERY FIGHTS FOR 10-YEAR GOAL

A spirited debate then ensued when Representative David F. Emery (Republican of Maine) argued for maintaining the 10-year timeframe. Emery explained his amendment for a 10-year goal:

One of the reasons I decided to offer the amendment is to voice the rather strong frustration that I feel as a professional engineer when I listen to some of those very poor arguments and poor excuses that I heard in this particular room, and also among other people who have not appeared before the committee to explain why we can't possibly convert to the metric system, and why it would be expensive, undesirable and confusing. Our neighbors to the north, Canada, testified very eloquently. They have had an easy transition. It was accepted well by the people. I feel, unless we put some teeth, so to speak into this bill, that the idea of metric conversion will languish. I don't think that we are facing the fact that the only reason that we are not putting ourselves on a timetable, or not facing the issue squarely, is because of pressure from certain groups that are politically powerful, or groups in industry as well who fear the transition. * * * We are not facing up to the issue, I think that we can convert to the metric system, do the job properly, and I think it would be far less painful if we would set a timetable and move in that direction and not try to pretend that we are doing something that we are not doing.

A majority of the committee felt the opposite way, however. Fuqua explained that as a supporter of metric conversion for a number of years, and as cosponsor of a bill including the 10-year timeframe, "after listening to many days of testimony of witnesses this year, I have reconsidered that point of view. * * * I say this because, number one, the administration's bill requested there not be a timeframe. * * * To some people, this really raises a red flag. I hope that we could

accomplish this within less than a 10-year time period. I think, to put that into the bill, is certainly not going to add anything to it."

Mosher supported Fuqua's argument:

I think I must associate myself with the comments you just made. I am a pragmatist. Even though I personally sympathize rather strongly with the emphasis that Mr. Emery's amendment would encourage, I must say, having gone through this business for three or four years, I recognize that as a matter of strategy at this time we are probably going to get further with the wording of the Lloyd proposal. I would support the Lloyd proposal.

Lloyd added:

All that we are talking about is how to make this the most palatable. *** The problem that we have had in the past has been a hangup because of the 10-year situation.

Emery asked for a rollcall, and Lloyd's substitute version was adopted by a vote of 9 to 1 in the subcommittee. Harkin then added an amendment specifying that agriculture be represented on the Board, and McCormack replaced the phrase "sizes and shapes" with the more definitive "dimensions and configurations." Fuqua then offered this bouquet to Symington:

I would like to take a moment to commend the Chairman for his diligence in holding days of hearings, in trying to work out a compromise encompassing different views of many people that have expressed them on this legislation. He has done a fine job. I think the Subcommittee owes him a real debt of gratitude.

When the full committee assembled for its markup session on June 16, the argument over the 10-year timeframe flared up again. Symington announced that by eliminating the timeframe and giving the Board "authority to consider what adverse impact might flow from the bill and make such recommendations as are deemed fit", both the AFL-CIO and small business would not oppose the bill. Goldwater took up the battle:

It concerns me that there is not some sort of target to shoot at. *** It would appear that one of the reasons for the bill would be to announce to the world and to the American people that it is our goal. *** If we do not have a goal set, no one will take us seriously.

Wydler argued against the time limit, observing that "I don't know how you can try to say you are going to have a voluntary program and set a time limit." In response to Wydler's question on where the AFL-CIO stood, Symington responded:

While they may not carry banners and march on behalf of the bill *** they will accept it.

This prompted Wydler to announce: "I want to express my lukewarm support for the legislation."

Scheuer and Brown urged stronger language directing the Board to come in with what Scheuer described as "an orderly, disciplined and intelligently structured timetable for the total conversion of American industry and commerce." Symington satisfied everyone by suggesting:

I think that kind of signal can also be given in the report.

The full committee then unanimously voted out the bill.

LABOR PRESSURES RENEWED

But the committee soon discovered it was not yet out of the woods so far as organized labor was concerned. Thomas Hannigan of the International Brotherhood of Electrical Workers, who had testified along with other labor representatives on April 30, was horrified to discover that although the language of the bill itself was generally acceptable to labor, the committee report contained far stronger language than labor could stomach. In an internal memorandum, Hannigan wrote:

This report will confuse and complicate the administration of the legislation, permitting a wide range of interpretation and the opportunity to pressure unwilling and reluctant organizations into converting.

Hannigan pointed out that the committee report "weakens Congress's commitment to providing Federal subsidies for workers' tools." He said labor objected to the report language: "To declare a national policy of converting to the metric system" which it contended did not conform to the policy statement which had been altered in the bill to read "coordinate the increasing use of the metric system." The labor representatives stormed over to the Rayburn Building and held a series of acrimonious meetings with Symington and the committee staff. "The bill is acceptable. The report is a disaster ***. We've been double-crossed on the deal," Hannigan complained. Loud and angry words floated out of Symington's office as the labor representatives threatened to withdraw their support of the bill. Symington offered to move to soften the title of the bill to read: "To declare a national policy of coordinating the increasing use of the metric system in the United States, and to establish a United States Metric Board to coordinate the voluntary conversion to the metric system." He also offered to meet labor's objections through a series of "clarifying" statements on the floor. Early on the morning of September 4, the day the committee appeared before the Rules Committee, these offers were transmitted to the AFL-CIO. The concessions were acceptable to the AFL-CIO. Labor agreed not to oppose the bill either in the Rules Committee or on the floor.



September 25, 1975.

Hon. Charles A. Mosher
2368 Rayburn Bldg.

Dear Charlie: Enclosed is a photograph I thought you might like to keep. It was taken the day we appeared before the Rules Committee on the Metric Bill.

Sincerely,

Olin E. Teague, M. C.

The Committee on Rules granted an open rule for one hour of debate, and the leadership very quickly scheduled the bill for debate on September 5.

SMOOTH SAILING FOR THE METRIC BILL

Absent their longtime, thorn-in-the-side opponent, Representative H. R. Gross, who had retired from Congress, and absent labor opposition, the committee found there was comparatively smooth sailing during the House debate.

In presenting the resolution from the Committee on Rules, Representatives John Young (Democrat of Texas) and James H. Quillen (Republican of Tennessee) summarized the arguments for the conversion in very positive terms. Quillen told the House:

I congratulate the members of the Committee on Science and Technology for their fine work. They have produced legislation which recognizes that any change in the traditional measuring system cannot be performed by the Government. It can be accomplished only by the cooperation of citizens engaged in all of the activities that make up our national life.

On a rollcall, the rule was adopted by a vote of 342 to 3.

Teague then led off the debate, commending Symington, Mosher, Fuqua, and Lloyd "for their hard work in bringing this bill to the floor." He remarked to his colleagues:

I am convinced that this bill is good for the country. Perhaps I will never learn the total metric system myself, but there is no doubt that today's school children will learn it sooner or later, and before long the housewife who goes shopping will understand it.

Teague later confessed:

During World War II, I walked all the way from the Normandy beaches to Strasbourg, and I never did know how long a kilometer was.

SYMINGTON SUMMARIZES POLICY DECISIONS

Symington underlined the fact that under the bill the change to the metric system would be entirely voluntary, and that the Metric Board would have no compulsory powers whatsoever. He summarized the four policy points in the legislation:

First, to plan to coordinate the increasing use of the metric system;

Second, to encourage voluntary participation of affected sectors and groups;

Third, to encourage efficiency and minimize costs to society; and

Fourth, to assist in developing a broad educational program which will assist all Americans in becoming familiar with the metric system.

Symington fully satisfied the labor opponents of the bill by asking a number of questions, which he then answered by underlining the strictly voluntary provisions in the legislation. These were the "clarifying" statements which he promised labor he would make.

Matsunaga wanted to know how the objections of small business and labor's interests in the cost of tools had been taken care of. Symington answered:

We have been in touch with the small business representatives, including John Motley of the National Federation of Independent Businessmen, and very recently we were assured by them that this bill meets the problems that they thought the prior bill presented. * * * The Metric Board has an obligation under this bill to study the harmful effects that any metric move made in this country could have on any element of society, and of course, none more importantly than the working people who own their own tools.

Matsunaga was fully satisfied with the explanation, and declared:

The gentleman from Missouri (Mr. Symington), the gentleman from Texas (Mr. Teague) and the other members of the Committee on Science and Technology deserve a great deal of credit for their perseverance and thoughtful efforts in bringing this legislation to the floor.

Mosher expressed strong support for the legislation, and his pleasure "that the objections from last year are now reconciled, and

the interests of labor and small business people in general are being protected." Mosher added:

This legislation is really needed and is deeply rooted in good, old-fashioned American commonsense. * * * The movement toward conversion to the metric system already has a tremendous momentum in this country and it is so imperative and so necessary. Yet we must avoid a chaotic movement. We must have an orderly process.

Fuqua, after praising Symington's long and dedicated efforts on behalf of the metric bill, concluded:

I am sure that without the leadership of the gentleman from Missouri this measure would not be here today.

Fuqua pointed out that industries like the automobile industry which were converting to metric were obviously interested in profits, and therefore "we must infer that each of them calculated that the benefits to be reaped by going metric would exceed any costs entailed." He added that in other instances costs had proven to be much less than expected. He noted that speeding up conversion would actually reduce costs in the long run.

Hechler reminded the House that the narrowing list of nonmetric nations had as of the day of the debate been reduced to South Yemen, Burma, Liberia, and the United States. Because it was common knowledge that Symington would be running for the U.S. Senate in 1976, Hechler rounded out his praise for Symington with this thought:

I trust also that passage of this legislation will add many centimeters to the political stature of the gentleman.

GOLDWATER AND EMERY DEPLORE LACK OF TARGET DATE

Bell, Winn, Pickle, Goldwater, Lloyd, Frey, Emery, Myers, and Dodd also made strong speeches of support for the metric conversion bill. Both Goldwater and Emery, as they had in the markups, expressed dismay that a target date of 10 years had not been set. As Goldwater put it:

Unless there is a time set definition, there will be no impetus, no reason for some segment of the industry to go metric. * * * I do support the legislation, but I think it has been weakened because the committee has not found fit to include this kind of incentive, at least a point in time when all Americans can strive to become a metric country.

Emery added:

It seems that it always takes as long to accomplish a task as there is time allotted for it. * * * Without this date or guidepost, I am afraid that metrication will fall victim to those who are unwilling to change.

Surprisingly, there were no opposition statements by those wanting to delay or defeat the bill, and no amendments were offered. The

bill passed by the comfortable rollcall margin of 300 to 63. The only committee member voting against the bill was Conlan.

ACCEPTING THE SENATE METRIC BILL

Once the House had passed the bill, the Science Committee carefully watched the progress of Senator Pell's bill, S. 100, which had also been tailored to meet the objections of organized labor and small business. Like the House bill, the Senate bill had no time limit for conversion and relied heavily on voluntary cooperation through a Metric Board, which included only 17 members in the Senate version as contrasted with 21 plus 4 congressional representatives in the House bill. When the Senate passed the bill on December 8, Teague immediately notified Symington and Mosher:

I believe that the House and the Senate bills are so close that we should seriously consider accepting the Senate passed bill and thus avoid the necessity of having a conference. * * * I intend, unless you advise me of any objections you may have, to move on the floor of the House to accept the Senate version of this bill in order that it can be sent to the President for his signature before the end of this session of the Congress. Please let me know your view on this matter no later than noon on Thursday, December 11th.

Symington and Mosher readily agreed with Teague's recommendation which was immediately activated, sending the bill to the White House, where President Ford signed it on December 23, 1975. In a statement when he affixed his signature to the bill, the President said:

I sign the bill with the conviction that it will enable our country to adopt increasing use of this convenient measurement language, both at home and in our schools and factories, and overseas with our trading partners.

In a letter to the Executive Director of the American National Metric Council on December 31, 1975, President Ford stated:

The Metric Conversion Act of 1975, H.R. 8674, which I signed on December 23, sets a national policy of conversion to the metric system and established a United States Metric Board to coordinate efforts for voluntary conversion.

But progress under the legislation was painfully slow. On April 5, 1976, Secretary of Commerce Elliot L. Richardson got around to calling on industry, labor, science, education, and several trade sectors to nominate members for the U.S. Metric Board. Twelve of the Board members were to be appointed by the President, with the advice and consent of the Senate, from lists of names recommended by organizations representing interests specified in the law, plus a Presidentially selected chairman and four at-large members to represent consumers and other interests. Science Committee members and other Congressmen began to inquire and wonder why the process was taking so long. Not until September 28, 1976, did President Ford finally announce the names of

those 17 Board members he planned to nominate. FBI clearances took several months, and by the time President Ford sent his nominees to the Senate early in January 1977, it was natural that the Senate should balk and decide to wait a few days until President Carter was inaugurated and could send up his own list.

PRESIDENT CARTER'S POLICY STATEMENT ON METRIC

There was the customary confusion at the start of the new administration after January 20, 1977. Obviously the President placed a higher priority on the Cabinet appointments and the problems with getting an acceptable CIA Director than he did getting the Metric Board running. Teague cajoled and prodded the White House to no avail. There was a strong push to get some kind of a policy statement, at least, from the White House. This was finally forthcoming on March 12, 1977, in a message from President Carter to the American National Metric Council, which said in part:

Adoption of the metric system of measurement in the United States will bring us in step with other nations of the world and enhance our ability to trade in foreign markets. My administration supports the provisions of the Metric Act, and I will submit to Congress my nominations for the U.S. Metric Board to see that its mandate is carried out. I am sure that the members of this Board will be guided and inspired by the accomplishments of the American National Metric Council and that they will look forward to working closely with you in achieving the goal of a metric America.

Teague was very gratified to learn that the President was on record in support of the Metric Act, and had committed himself publicly to nominate the Board members. In a statement to the American National Metric Council on May 6, 1977, Teague said:

I am delighted that President Carter has recently expressed his support for the Metric Act and his intentions to send the names of his own nominees to the Senate for confirmation. I urge the President to do this as quickly as possible so that the many leaders in business, labor, industry and education as well as all our citizens will have a clear signal that the Act, which calls for the conversion to the metric system by individuals and organizations in accordance with the principle of voluntary participation, will be implemented.

As 1977 wore on without action by the President, further excuses were forthcoming from the White House staff. First it was that the President's nominees had to have FBI clearance, which everybody understood, but that took a lot of time. By the fall of 1977, a new question had arisen, whether the nominations would be held up pending a study of the future of the Metric Board by the President's reorganization task force. The Science Committee pushed and prodded, but little in fact was done until 1978. One of President Carter's appointees was Thomas Hannigan of the International Brotherhood of Electrical Workers, who had led the charge to water down the 1975

act. After he was confirmed by the Senate with the other Metric Board nominees, Hannigan continued as an outspoken advocate of the carefully slowed down approach to metric conversion on which he had insisted during the consideration of the 1975 act. Hannigan, as a Board member, proved to be an articulate and outspoken exponent of the point of view that the Board was a passive referee. To achieve a consensus, the Board sometimes deferred to his views.

During 1977 and 1978, the committee held no formal hearings and made no reports on the metric system. Throughout the entire period, it almost seemed as though progress was at the rate of one millimeter forward and one meter backward.

A ROSE BY ANY OTHER NAME

The "giant" forward step was taken in May and June 1977. A tempest in a teapot arose when Robert A. Hopkins, editor and publisher of the American Metric Journal, visited Teague in his office and complained that there was great confusion in the spelling of metric terms. Two warring camps had built up thick battle files to prove their respective contentions that "metre" and "litre" merited preservation as the pristine pure version, as against the debased, Americanized spelling of "meter" and "liter." Hopkins subsequently wrote Teague:

It is costing Americans too much to switch spellings to please a select few who complain that these are foreign (sic) spellings and since the metric system is borrowed from France anyway why use a "foreign" (sic) spelling for two of the most important words.

Seizing the bull squarely by the horns, Teague picked up the telephone and called Dr. Jordan J. Baruch, Assistant Secretary of Commerce for Science and Technology. He then wrote Hopkins:

Dr. Baruch has agreed to look into the question of the spelling of the metric units and advise me of the view of the Department.

There may have been little or no action on getting the President to nominate members of the Metric Board, but by gum they really got cracking when it came to resolving the burning issue of how to spell those words metre, litre, meter, or liter. Acting at breakneck speed, it took Secretary Baruch only 32 days before he responded in an authoritative fashion in a letter to Teague dated May 31, 1977. The letter started out with the tentative observation that "this subject has received far more attention than it is worth." He then gave it all away by confessing how he personally leaned on the issue:

My feelings on the matter can best be expressed as follows:

We allow "metre"

But "meter" is metre.

Baruch then went on to state that on September 15, 1976, the Inter-agency Committee on Standards Policy had adopted a resolution endorsing the spelling of meter and liter with "er", "with the provision that agencies have the option of using 're' when appropriate in international relationships." He also noted that the Commerce Department in a December 10, 1976 notice in the Federal Register had favored this spelling: meter. Baruch clinched the case with the following conclusion:

Accordingly, it is the view of the Department of Commerce that all Government agencies should follow the rule of using the "meter" spelling. It is our expectation that any exceptions to the rule of using the "meter" spelling will be limited to those situations where it is appropriate in international relationships.

Teague made sure that the world knew about this earth-shaking decision by officially inserting Baruch's letter in the Congressional Record of June 9, 1977. Teague informed the Congress:

Mr. Speaker, since the passage of the Metric Conversion Act of 1975, there has been some discussion of one comparatively small question in the metric field. * * * I am glad to be able to report that Dr. Baruch has settled the question, and that a reasonable position had been arrived at.

Although Dr. Baruch also advised in his letter that "it is also our view that the private sector should be encouraged to adopt the same rule", the unreconstructed rebels against the "er" spelling were not at all pleased. Do you think they appreciated Teague's efforts? Not on your tintype. Teague continued to receive correspondence from those who felt deeply aggrieved. "Obdurate" was the way the U.S. Metric Association characterized the Department of Commerce; "Arbitrary and unilateral" said a writer from Tulsa, Okla.; "uneducated" wrote a Californian, who also pointed out that, after all, "metre" would tell you how a measurement could be differentiated from a parking meter or electrical meter.

THE HIGHWAY ADMINISTRATION GAFFE

There were other disturbing occurrences in 1977 and 1978 which marred the steady progress toward metric conversion. In April 1977, William M. Cox, Federal Highway Administrator, decided to implement the policy to convert to metric at a rate far exceeding the posted speed limits. It was quietly announced in the Federal Register that highway signs, distances, and speed limits would soon be posted in metric terms. The hitch was that there was no provision for dual postings during an interim period, no coordination with State Highway departments, and everybody was taken completely by surprise. The whole exercise gave the metric system a black eye, and infuriated

many Members of Congress who were getting angry mail from constituents, and several bills were introduced in Congress to block the proposed action. Teague expressed his displeasure in no uncertain terms, stressing that the 1975 act was a voluntary one. The Highway Administration withdrew its abortive plan in June, but damage had been done to the cause of conversion. Teague later explained:

In my district in Texas, which is about 200 miles long and 100 miles wide, with interstate highways running the length and width of the district, you can imagine the storm of protests I got from my people when the highway people were going to put up those signs with kilometers on them. I began to hear from my people. They really gave me Hell.

Teague stressed this point in a letter to the President, July 14, 1977, including the following:

I am very much concerned about the manner in which this matter was handled. I am particularly concerned that the ineptness and the resulting adverse publicity has produced a set-back to the nation's orderly adoption of the Metric system. * * *

The Metric Conversion Act of 1975, which was reported out of my Committee after extensive hearings over several years, specifically provided that conversion shall be made entirely on the basis of voluntary participation. Furthermore, the Act fully recognizes the need for careful coordination and extensive public education as part of the changeover process. It appears that none of these principles were followed in the Federal Highway Administration's proposal.

At the same time, Teague urged the Federal Highway Administration to develop a proposal for the changeover to metric highway signs which would minimize the adverse effect on the public while moving forward. He added:

In my view, the set-back which they have experienced should not be allowed to bring the process to a standstill. I want to assure you of my support for a reasonable and well-considered Metric conversion plan for the F.H.A. and for the other agencies of the Federal Government.

Cox wrote Teague on August 19, 1977, enclosing a policy order by Secretary of Transportation Brock Adams (a former member of the Science Committee) from which Cox indicated the Highway Administration "will develop a phased plan of action for an orderly transition from the customary system of units to the metric system." The controversy then died down.

FROM FAHRENHEIT TO CELSIUS

In the spring of 1977, the U.S. Weather Service developed a tentative plan to stimulate public awareness of the use of "Celsius" as well as Fahrenheit in dual announcements for use by news media. The Weather Service began with temperature announcements, which were to be followed by other metric measurements such as precipitation and

wind speed. Unlike the bull-in-the-china-shop approach of the Highway Administration, the Weather Service dipped a tentative toe into the water before plunging in. First, the proposed plan was published and circulated. Second, a public conference was held in Washington, D.C., on June 30, 1977, to receive public comments on the proposed plan. Third, 300 copies of the draft plan were mailed to affected organizations such as instrument manufacturers, news organizations, farm and consumer groups, et cetera.

When Congressmen went home to their districts in July 1977, during the "district work period," they began to receive questions and complaints about the Weather Service plan. Teague also received queries in Texas and correspondence from his constituents. As a result of all these inquiries as well as the generally angry reaction against the Highway Administration, Teague decided to send out an explanatory memorandum to radio, television, and news executives to give them an authoritative background. The memorandum, dated September 6, 1977, had this covering letter from Teague:

I have received a number of letters and comments about the changeover to the Metric system which is now increasingly affecting every citizen.

Some of these letters and comments reflect information made available through the media, and frequently they appear to involve an incomplete understanding of what the position of the Congress and the President is in this matter.

In his memorandum, Teague explained the historical background of the metric movement, what was happening throughout the world, the fact that the 1975 act was voluntary, and all that the act provided for was "to conduct public education activities and to assist in the coordination of the ongoing changeover in industry, trade, education, government, and other sectors of our society." He described why he had opposed the precipitous changeover clumsily attempted by the Highway Administration. He then went into the Weather Service activities in some detail, concluding:

Whatever the Weather Service finally decides to do will not be in the form of a regulation.

He noted that neither the Weather Service nor the U.S. Metric Board could make any newspaper, radio, or television station use either dual measurements, or metric only, and that "each media organization is entirely free to adopt whatever way of providing weather information it sees fit."

THE COMMITTEE STEPS INTO THE BREACH

Actually, what Teague was doing was filling the vacuum which had been left by the failure of the Metric Board to get organized and do the job assigned to it by the 1975 act. The confusion, and false

starts by the Highway Administration, had forced the Science Committee to give the public a clarification which was really the responsibility of the helpless infant Metric Board which was still struggling to stay alive in an incubator.

Whenever Teague went home to his district, he was bombarded with critical inquiries from average people who were disturbed that they were going to be forced into a mandatory metric system overnight. Angry letters expressed the same view. To all of these protests, Teague responded that the act was purely voluntary. The answer mollified those making the inquiries, until they began bringing up the example of the Highway Administration, along with expressing the fear that other agencies would certainly come along with mandatory regulations. Teague answered:

If they interpret this Act as not being voluntary, then I'll introduce legislation to get it repealed.

To be sure that everybody knew that he wasn't kidding, Teague instructed Dr. Holmfeld of the staff to prepare a draft bill to repeal the Metric Conversion Act of 1975. The draft was ready, but fortunately Teague never had to use it.

Friends of the metric system were deeply disturbed by the events of 1977. Teague and McClory decided to send a joint letter to invite concerned Congressmen to discuss what could be done to get implementation of the Metric Act back on the track. In a letter dated July 29, 1977, they pointed out that "there has been a slowdown in Federal Metric activities," illustrated by the counterproductive proposal of the Highway Administration which "may have led to a slowdown of progress by other Federal agencies."

The congressional meeting took place in room 2317 of the Rayburn Building on August 4, 1977. Senator Pell came over and several House staff members were present. Malcolm O'Hagan, president of the National Metric Council, who was later named Executive Director of the Metric Board, was present. There was a great deal of hand wringing, and some constructive suggestions were batted around, but the underlying conclusion was that most of the problems would not be solved until or unless the Metric Board was firmly established and actively operating.

THE PLUSES AND MINUSES OF 1977

There were both pluses and minuses in 1977. The wine bottlers and distillers decided to move into metric measurements by 1979. The Department of Agriculture decided to release its data on crop yields in metric terms. The Patent and Trademark Office issued a requirement for

the use of metric on patent applications. The automobile industry, computer, and farm equipment manufacturers were in the forefront of massive changeovers to the new system. Early in September 1977, all speed limits and distances in Canada were switched to metric symbols. Instead of tiptoeing in through use of the dual system, Canada's coordinator of metric conversion explained, "If you go dual, all you do is prolong the agony." But when the U.S. Highway Administration tried to do it the same way, all they got was raspberries.

For what it was worth, a Gallup poll late in 1977 indicated that only 24 percent of Americans interviewed knew and approved of the metric system, while 45 percent knew of it and opposed its adoption, 5 percent knew and had no opinion, and 26 percent were unaware of the system.

METRIC BOARD FINALLY GETS UNDERWAY—1978

The activation of the U.S. Metric Board continued to move only a millimeter at a time in 1978. When the President finally submitted his list of nominees, and the Senate Commerce Committee held confirmation hearings on March 17, 1978, Thomas A. Hannigan told the committee: "I feel it's important to avoid a national commitment to the metric system." Chairman of the Board Louis F. Polk, expressed some caution on the question of pushing people metrically: "I don't know why we should put any citizen into unnecessary hardship in this situation." It may or may not be coincidental that when the members of the Metric Board were sworn in at the White House, both the President and Vice President were out of town.

Representative Philip M. Crane (Republican of Illinois) made two unsuccessful attempts to throw monkey wrenches into the metric machinery. On July 13, Crane offered an amendment to the Elementary and Secondary Education Act to eliminate funding a metric education program in the schools at an annual cost of \$2 million. The amendment was defeated on a division vote, 48-13, with Representative Eldon Rudd (Republican of Arizona) speaking for it and McCormack against it. Rudd argued:

If there is one thing that most Americans do not want or need, it is another expanded Federal effort to promote U.S. conversion to the metric system—especially by using school children as the instruments for social and economic change.

McCormack countered:

Clearly, Mr. Chairman, we are in the metric age. We should recognize it, and should not be trying to deprive our children of a thorough, working understanding of the metric system.



A strong supporter of the space program, Representative Eldon Rudd (Republican of Arizona), right, was also one of the leading critics of the metric system. Here he is shown on a committee inspection trip at Kennedy Space Center with, from left, Miles Ross, Representatives Carl D. Pursell (Republican of Michigan) and Dale Milford (Democrat of Texas), along with Lee R. Scherer, at that time Director of the Kennedy Space Center.

Exactly a week later, Crane was back with another amendment to a supplemental appropriations bill, designed to knock out \$1.8 million for the U.S. Metric Board. Once again McCormack took on Crane, arguing:

The fact is that we are, in this country, converting to the metric system at this time, and that we cannot avoid converting. The question before us is: Will conversion be orderly and smooth and programmed to get us into an era of understanding and casual, everyday use of the metric system, or will the conversion be erratic, confused, strung out, unending and disruptive, as would happen if the gentleman's position were adopted?

One other member of the committee, Representative Thomas J. Downey (Democrat of New York), one of the youngest Members of the House, brought laughter by remarking:

I personally do not like the metric system very much, preferring yards to meters and miles to kilometers. But I realize that I am of an older generation, and I hope for a future generation that we will be able to have a metric system.

Rudd went one step farther. He introduced H.R. 12881, a bill to repeal the Metric Conversion Act of 1975. Rudd explained:

It is wrong to impose the metric system on America. Our system of measures has never been a problem in the history of this country. * * * I looked at my mail, and a great many people were very much against the idea of this country going metric. And after thinking about it, I decided that I was against the idea too.

A Chicago Tribune columnist named Bob Greene praised Congressman Rudd in an August 16, 1978 article, entitled "Repeal Bill Could Put Metrics 6 Feet Under." Greene is the founder of a voluntary, no-dues organization named WAM ("We Ain't Metric").

GAO REPORT RAISES DOUBTS

Metric conversion received another setback on October 20, 1978, when the General Accounting Office issued a massive and somewhat unfavorable report entitled "Getting a Better Understanding of the Metric System—Implications if Adopted by the United States." It came as somewhat of a shock to the Science Committee to read the GAO's conclusion:

Despite opinions and statements to the contrary, it is not the current United States policy to convert from the customary system to the metric system.

The GAO cast some doubt on the underlying assumptions of the Metric Conversion Act of 1975, by stating:

Action should be taken to ensure that metrication does not occur merely because it is thought to be inevitable, which is apparently what is taking place today. * * * Actions by Federal agencies, multi-national firms, educators, and others aided by a general feeling of inevitability and misstatements about metrication throughout the country tend to forge a metric policy for the entire Nation.

News articles based on the GAO report tossed more sands of confusion into the eyes of the public. The United Press International led off its analysis this way:

The United States is moving toward the metric system without a clear understanding of what is involved or whether the change is worth the effort, the General Accounting Office says.

TEAGUE SPELLS OUT INTENT OF CONGRESS

The GAO report and the publicity which accompanied it came as a shocker to a majority of the Metric Board as well as a majority of the Science Committee. Teague decided to set the record straight by sending an authoritative letter to the Chairman of the Metric Board, Dr. Louis F. Polk. It was this letter which was quoted at the outset of the chapter, and dispatched on November 27, 1978, only a

few weeks before Teague left Congress. Teague spelled out in the letter the clear intent of the Congress:

Contrary to the analysis in the GAO report and some of the news stories which have accompanied its release * * * (Congress) set forth a clear policy for Metric conversion in the United States. That policy is to facilitate the conversion to Metric use in our country in order to reduce the total cost and inconvenience to our people. *** I would emphasize that the fact that the process is voluntary does not mean that the role of the Board should be a passive one. The Board, in its public education activities should try to reach every American both directly and indirectly through school boards and teachers, the media and trade and labor organizations, and other appropriate means. In its coordination activities the Board should actively seek out the members of every sector in our society which may be affected by conversion to Metric with the aim of identifying those who wish to participate in the Board's coordination work. Such an active approach to its mission, always keeping in mind that participation is to be voluntary, is what the Congress, and I am sure the President, expects from the Board.

Teague concluded his strong letter of support to Chairman Polk with these words:

I hope you will bear in mind that in my view and in the view of my colleagues in the Congress the changeover to the Metric System which is now underway will affect every American. The program intended by the Congress and mandated in the law is aimed at making the changeover take place in the most economical and effective way.

SUPPORT FOR METRIC SYSTEM IN 1979

On a number of occasions in 1979, Fuqua reiterated his support for voluntary conversion to the metric system. His position was clearly spelled out in a February 7, 1979 letter to Dr. Polk, which included the following comments:

Since becoming chairman of the Committee on Science and Technology earlier this year, I have had a chance to review the recent developments surrounding the U.S. Metric Board. ***

Let me observe first that I entirely share the views expressed by the former chairman of our committee, Mr. Teague, in his letter to you on November 27. You may recall that in 1975, while serving on the Science, Research and Technology Subcommittee, I was a supporter of the bill, which led to the Metric Act. I attended all the hearings held at that time and I gave careful weight to the different opinions expressed by several witnesses. The final form of the legislation had my strong support at the time and it continues to have my strong support.

The basic principle of our metric policy is that the Government, through the Board, shall seek to make the ongoing conversion to metric take place in the least disruptive and most effective way. Our policy includes the important principle that the conversion is voluntary. At the same time the U.S. Metric Board must actively search out those areas where voluntary conversion is now, or may in the future take place, with the purpose of speeding the process along in the most effective manner.

In his letter, Fuqua advised Dr. Polk that he hoped the GAO report would not discourage or delay the work of the Board. He

acknowledged that "recent adverse and partially inaccurate publicity about metric" had indeed discouraged some people. But he urged the Board to press on with its "challenging and important task" which he linked with restoring "the country's technological innovativeness and productivity."

OPPOSITION IN 1979

The opposition forces generated some support during 1979. To a resolution of the North Dakota Legislature opposing any legislation by Congress mandating conversion to the metric system, Fuqua responded on May 14, 1979, that "the chances of such legislation being considered or passed would be very small." In a letter to Robert Willson of San Antonio, Tex. on May 24, 1979, Fuqua stated:

No one should be forced by the Government to adopt the metric system, and the guiding principle for those who desire to make a change should, according to the Act, be that only when it makes economic sense should anyone adopt the metric system.

Brown added his support to voluntary conversion, as expressed in a June 27, 1979 letter to Dorothy K. Gross in Charlottesville, Va.:

My own feeling is that the Government should neither force anyone to "go metric" nor should the Government prevent anyone from using it. I think that those State boards of education, such as Michigan and California, who have introduced the teaching of metric in elementary schools are performing a service for the coming generation, many of whom will need to be familiar with both systems.

Meanwhile, there was an active campaign being carried on to repeal the metric legislation. In Congress, half a dozen or so bills were introduced to rescind or seriously weaken the provisions of the 1975 legislation. More seriously, the House Appropriations Committee voted to slash the Metric Board funding from the President's budget request of \$3,335,000 down to \$1,613,000, adding in the committee report:

The committee is concerned that the Board, in its policies and actions, is becoming an advocate of the metric system and is giving the impression that our official national policy is to convert to the metric system albeit voluntarily.

There was considerable soul searching within the Science Committee as to how to approach this crippling action. When the appropriations bill reached the House floor, on July 12, 1979, Crane made a new assault on the metric policy by launching a fight to wipe out all the funds for the Board. Crane argued that it should not take a new Federal agency bureaucracy to tell the people what they had a right to

decide. McCormack tangled with Crane on their differing interpretations of the 1975 law, as follows:

Mr. CRANE. I just want to remind the gentleman from Washington (Mr. McCormack) of the operative language, "The policy of the United States shall be to coordinate the voluntary conversion to the metric system." That is the policy.

Mr. McCORMACK. That is correct. The responsibilities of the Board include coordination of voluntary activities by any individual or entity, as this country converts to the metric system, under its policy as established by the law.

Mr. CRANE. The policy is voluntary conversion.

Mr. McCORMACK. The word voluntary applies only to individuals and corporations. The policy of the Nation is to convert to the metric system.

Mr. CRANE. What is the Nation? The Nation is all of us individuals.

Mr. McCORMACK. The policy of the Government is to convert to the metric system. That is the law.

Ertel, Ritter, and Goldwater also spoke against the efforts of Crane to reduce the metric appropriation to zero. But Crane succeeded in increasing his vote from the 75 he received in 1978 to 122 in 1979, despite his amendment losing by 280-122. Voting with Crane were the following committee members: Carney, Hance, Kramer, Roth, Walgren, Walker, and Watkins. Even though the Senate voted the full amount asked in the President's budget, and the White House publicly encouraged a strong interpretation of the 1975 legislation, it was evident that there was considerable educational work needed by the advocates of the metric system. The conference committee in 1979 compromised on \$2,474,000 for the metric appropriation—exactly halfway between the House and Senate figures. Clearly, the metric system still faced a rocky road ahead.



Research Management Advisory Panel, established by the Daddario subcommittee, at a 1969 meeting at the Massachusetts Institute of Technology. Top row, from left, James B. Fisk, president of Bell Laboratories, Inc.; Representatives Daddario and Mosher; Wilfred J. McNeil, president, Tax Foundation, Inc.; Michael Michaelis, Arthur D. Little, Inc. (executive director of the Panel); Richard Carpenter, Legislative Reference Service, and Dr. J. Thomas Ratchford, committee staff. Front row, Dr. George B. Kistiakowsky and Dr. James R. Killian, Jr., science advisers to President Eisenhower; Chairman Miller, Dr. Jerome B. Wiesner, science adviser to President Kennedy; and Dr. Donald F. Hornig, science adviser to President Johnson.



Down through the years, the Science Committee consistently stimulated greater emphasis by the National Science Foundation on science education, to build up and replenish the reservoir of future scientists.

Science, Research and Technology, 1970-79

Up until the landing on the Moon, the Manned Space Flight Subcommittee was universally regarded as the most prestigious and sought-after subcommittee. In 1969, Teague's group included 12 members to 10 for the Science, Research and Development Subcommittee; by 1971, the ratio was 11 to 11. In the early 1970's "S.R. & D." was clearly a glamor subcommittee, vying with the rising attraction of energy as an issue, especially with the creation of a task force on energy under S. R. & D. in 1971. In 1975, as the two new energy subcommittees were created to meet the challenge of expanded committee jurisdiction, the name of the subcommittee was changed to "Science, Research and Technology." Thereafter, "S.R. & T." took a back seat to the interest in energy and recruitment of subcommittee members proved to be difficult.

From 1963 through 1970, Mim Daddario dominated the subcommittee. He was succeeded by a revolving-door series of three chairmen: Davis, Symington, and Thornton. During the 1970's, there was far less stability as political ambitions and electoral casualties resulted in an extensive shakeup of committee personnel. Continuity was provided by Philip B. Yeager, a veteran of the original select committee, who served as staff director throughout the entire period from 1963 through 1978 and was characterized by Theodore W. Wirths of the National Science Foundation as "one of the Hill's legislative craftsmen."

WILL APPLIED RESEARCH DILUTE BASIC RESEARCH?

When the committee rewrote the charter of the National Science Foundation in 1968 to open the door for more applied research, it soon became apparent that there was a divergence of opinion both within the committee, between the committee and NSF and in the scientific community, over the extent of emphasis to be placed on basic research. In 1969, and again in 1970, one of the big issues before the committee was the extent to which the NSF should seize the initiative in undertaking and encouraging applied research. The committee was apprehensive that the new authority in the charter, at a time of new budget reductions, would cause NSF to go overboard and encourage eager applicants to spend the scarce funds on "immediate payoffs" at the

expense of otherwise neglected basic science. Following up some cuts in the applied research programs by the committee in 1969, the 1970 quizzing on these issues was challenging and critical. At stake was that portion of NSF's work which later came to be known as "Research Applied to National Needs." After attacking the program in 1969, and leading the effort to cut it from the budgeted request of \$10 million down to \$6 million, Daddario raised many questions about the 1970 request for \$13 million. "There are still some cynics in the Congress," Daddario observed, but the committee agreed to the increase. It was not so much that some members opposed the program; they just wanted to be sure it did not crowd out or reduce basic research.

The committee confronted even more serious challenges in 1970. The so-called Mansfield amendment, requiring the Department of Defense and other mission-oriented agencies to confine their research to the specific mission of the agency, forced the termination of several projects in which NSF was interested or obligated to pick up. In addition, the committee hearings revealed a need to stimulate greater interest among younger scientific talent through additional graduate traineeships and other means.

In announcing an increase of \$27.6 million over the \$500 million budget for NSF, Daddario stated on March 24, 1970:

This year the situation with regard to the National Science Foundation has radically changed. During the past year, we have found that demands for new programs were coupled with cutbacks in scientific research and training by the mission agencies. But resources have not been available to the NSF to fund the meritorious programs among those being terminated. Our review has shown the Administration request is inadequate to meet the bare minimum requirements for the NSF support of American science. * * *

Mosher indicated that the NSF increase "proves largely illusory, when measured against the new responsibilities NSF is inheriting as castoffs from other agencies." He added:

The net result will almost certainly be a decrease next year for overall support of basic research.

NSF FUNDING IN 1970

A hot battle developed on the House floor over a Roudebush recommittal motion to cut NSF funding back to the budgeted figure of \$500 million. Roudebush contended:

The question before us today, as I see it, is not that of choosing leadership or mediocrity in science. Rather, it is that of supporting sound budget policies.

Gross could not resist pointing out that so far as leadership was concerned "we are the undisputed leader of the world in spending money and accumulated debt as a government." Symington responded:

Yes, half a billion dollars for the National Science Foundation is a lot of money. It is about the cost of 2 weeks or less of war, and it is roughly 5 days of all our U.S. military commitments around the world.

As frequently happened, Gross discovered a study he held up to ridicule—NSF funding of a "study of penguins," prompting the following exchange:

Mr. Gross. This grant happens to go to an Iowa college—

Mr. SYMINGTON. As it is an Iowa college, I must assume it is a meritorious grant.

Mr. MILLER. I had the privilege of going to Antarctica, where most of this work is being done. *** These people were very much excited about the discovery. *** I am not a biologist, so I cannot tell the gentleman all the details of the study. All I can tell you is that they were excited.

Mr. Gross. The penguins or the scientists?

The committee won the spirited fight over the Roudebush motion, by a recorded rollcall vote of 188-137. Roudebush persuaded four other committee Republicans to go along with him in cutting NSF funds: Pettis, Lukens, Frey, and Goldwater.

The committee's strong support for graduate traineeships, the college science improvement program, environmental research, and State and local science policy planning was not only shared by the Senate, but also given added funding support in the Senate. In the environmental area, the committee stressed the use of existing Federal laboratories rather than "the pattern of building new laboratories to solve each major new problem."

SUBCOMMITTEE IN 1971

At the start of 1971, the following members composed the Subcommittee on Science, Research and Development:

Democrats

John W. Davis, Georgia, *Chairman*
Earle Cabell, Texas
James W. Symington, Missouri
Richard T. Hanna, California
John F. Seiberling, Jr., Ohio
Mike McCormack, Washington

Republicans

Alphonzo Bell, California
Charles A. Mosher, Ohio
Louis Frey, Jr., Florida
Marvin L. Esch, Michigan
R. Lawrence Coughlin, Pennsylvania

Chairman Davis did not build the same reputation for leadership throughout the scientific community as had Daddario, but he had a scientific mind with an inquiring curiosity which served him well in

his new role. He never had any compunctions about asking fundamental questions. For example, NSF was a month into its 1971 hearings when Davis suddenly asked NSF Deputy Director Raymond L. Bisplinghoff:

I feel I can put myself in the position of Jacob as he was trying to climb the ladder to heaven. If I ever get to the top of the ladder, that is the day I will know the difference between applied and basic research.

Dr. Bisplinghoff attempted this clarification:

By basic research, we mean research we do to create new knowledge. * * * In managing our basic research program in the Foundation, we judge the proposals which we receive primarily on the basis of their quality and the quality of the investigator, and the promise of the proposal that it might lead to some new knowledge in the area of science. On the other hand, applied research is research where we take existing fundamental knowledge that has already been created and put it to work in the solution of some problem. * * * Now we come to problem-oriented research, which I would like to emphasize is the phrase which distinguishes the RANN program. Here we will make a special effort to pick out several important targets which relate to national needs, such as energy resources, targets which relate to the environment, targets which relate to our social systems. We will focus our efforts on those targets.

THE OMB AND APPLIED RESEARCH

By 1971, the committee faced a new problem with respect to NSF: the Office of Management and Budget began to play a forceful role in directing NSF to spend more money on applied research and existing projects and already-trained scientists, and less on "irrelevant" research or training new scientists and academic support. Late in 1970, OMB offered NSF a \$100 million increase in its budget to be presented in 1971 if other major actions were taken such as phasing out institutional support. The "offer" was scarcely a choice, and NSF frantically geared up to try and convince the committee that there was logical justification for these rather radical changes. On February 2, 1971, Chairman Davis sent NSF Director William D. McElroy a tightly worded three-page letter pointedly reminding him of the specific initiatives expressed in the 1970 legislation, and asking him what had been done about them.

The 1971 hearing represented one of those triangular tugs of war, with the scientific community silently cheering the committee's efforts, the NSF witnesses loyally trying to hew to the OMB line, and the committee vigorously attempting to preserve basic research. Mosher characterized the new budget proposals as "almost revolutionary new directions for the work of the National Science Foundation," involving "increased emphasis on research in the social sciences and very heavy emphasis on applied research. It would appear that you are almost moving into a mission-type agency in some respects. * * * I share some of the concern that has already been expressed here."

RESEARCH APPLIED TO NATIONAL NEEDS—RANN

On the other hand, McCormack strongly supported the sharp increase from about \$30 million to about \$80 million in the RANN program which NSF had budgeted in 1971, on the grounds that "the RANN program has a heavy emphasis on environment systems and social and human resources." Yeager estimated that in two years the applied research programs had soared from 1 percent of the NSF budget to 12 percent, and "might even get as high as 25 percent in future years." McCormack attempted to reduce the RANN program by only \$10 million (instead of the \$30 million cut voted by a majority of the subcommittee), but was defeated on an 8-to-2 rollcall vote.

Looking back on the 1971 hearings, Dr. Lloyd G. Humphreys, NSF's Assistant Director for Education for a 15-month period, wrote Teague:

One of the brighter moments during that 15 months occurred during hearings before your Committee.

It seems that Congressman Cabell was pressing Dr. Humphreys rather hard on whether it was OMB or NSF which had ordered such sharp reductions in institutional support and traineeships, along with RANN increases, when Chairman Miller intervened to cut off the discussion. Dr. Humphreys went on to recall:

By accident or design an OMB representative was in the hearing room and congratulated me afterwards on my defense of the budget. Since I had had no hand in the decisions and had not even been informed concerning the reasons behind those decisions, his congratulations did not set very well with me.

Testifying on April 7, Dr. Philip Handler, President of the National Academy of Sciences joined a majority of the committee in deploring the cuts in institutional support and traineeships:

I consider that taking money from these two programs is a trend in the wrong direction. The NSF support of graduate education is on the road to extinction if the recommendations in this year's budget are indeed implemented.

Handler termed RANN a "large and necessary experiment." But his true feelings came through when he observed:

This program has, as yet, had no great successes of which it can boast. I hope the reason is only that it is young. To date, one cannot make any great claims that it has really solved a major problem that is pressing on our society.

SUBCOMMITTEE DECISIONS IN 1971

The subcommittee reached several policy decisions on the NSF budget in 1971. First, they decided to "line item" the authorization, giving Congress greater control and oversight over programs than the former "lump sum" method. Second, they kept the same total recommended by the administration—\$622 million—but redistributed it by

taking some of the sharp increase away from the RANN program and giving it to science education and institutional support. The decision to restore funding for high school summer institutes and college undergraduates was accompanied by a very effective letter-writing campaign. A spokesman for the committee was asked whether the campaign had been organized, and the response was:

I don't know whether it was organized or not. If it was, it was damn well done.

During the floor debate on the NSF authorization in 1971, Chairman Miller took note of the public and university campaign to fight the NSF cutbacks in science education:

These cutbacks, I might say, produced strong quakes throughout the academic community and, as all Members know, the reverberations were clearly felt here on Capitol Hill.

The committee's efforts received overwhelming support on the floor by a rollcall vote of 319-8 on June 7, 1971. The Senate was very bullish on increasing the total NSF budget from \$622 to \$706.5 million, and the conference compromised on \$655 million.

IMPOUNDMENT OF NSF FUNDS IN 1971

But who gets the last word when Congress and the President tangle over policy? In the early 1970's, President Nixon used a very clever technique to thwart the will of Congress. He called it "impoundment" and it simply meant that when Congress appropriated money for programs Congress wanted and the administration didn't want, the money just was not spent, on orders of the Office of Management and Budget (acronym "TOMB"). In September 1971, the committee was particularly angered by impoundment of \$30 million appropriated for science education and institutional support. Chairman Davis wrote a sharp letter to the President on September 14, 1971, pointing out:

It is ironic that this OMB action, which endangers the long run health of American science, was taken at almost exactly the same time as your call was made for proposals to preserve American scientific leadership and the economic advantages it entails. I hope that you will take steps to reverse this action, which contradicts the will of Congress, including the NSF authorizing and appropriating committees in both the House and the Senate, as well as the almost unanimous expert opinion of educational authorities and scientists.

The letter did not produce the desired results. Although the impounded funds were released in 1972, the new budget presented once again made very deep slashes in funding for science education and institutional support. It was with some frustration that the committee in 1972 voted sharp increases in these areas, increases which were sustained in the House and maximized in the Senate.

A NEW DIRECTOR FOR NSF IN 1972

At the end of 1971, NSF Director McElroy left to become chancellor of the University of California at San Diego, and he was succeeded by an old friend of the committee, Dr. H. Guyford Stever, president of Carnegie-Mellon University in Pittsburgh. Dr. Stever was one of the original members of the Panel on Science and Technology who had met with the committee on numerous occasions since 1960.

The year 1972 represented a shift in attitude within the committee toward the RANN program. Some of this shift may have resulted from a softening of opposition from the scientific community. Science magazine once observed:

The university scientist has traditionally responded to the idea that he do applied research in much the same way a proper Victorian maiden reacted to an improper suggestion.

When it was discovered that nearly 75 percent of RANN funding went to universities, plus NSF efforts to cover in neglected research and relate it to make it eligible for RANN funding, the opposition was not as strong. Within the committee, Bell was the No. 1 cheerleader for RANN. Bell even went so far as to see the program as the magic answer to the biggest problem plaguing his California congressional district—the high jobless rate among scientists and engineers. This prompted Chairman Miller to use his favorite scare word:

But what you're talking toward is a WPA for scientists, Mr. Bell.

Nevertheless, Bell's excitable, machinegun delivery kept RANN's skeptics off balance. To satisfy Bell, Chairman Davis interrupted the subcommittee's markup of the NSF authorization bill to allow Dr. Alfred Eggers, a NASA alumnus heading up the NSF RANN operation, to reappear and brief the subcommittee on RANN's achievements. Dr. Eggers explained how RANN had scientifically studied the workload of New York City's sanitation workers and made some practical suggestions for more efficient collection and disposition of the megatonnage of solid waste in the Nation's largest city. Along about this time, the work of the McCormack task force on energy (see chapter XIV) was expanding, with the active support of several RANN projects. The upshot was that in 1972 the committee overruled its own staff recommendation and voted to fund RANN with the full \$80 million authorization budgeted.

The committee initiated a major step in 1972 to underline its strong support for science education. The original 1950 act stipulated that the NSF should promote "basic research and education in the sciences." Amendments fostered by the committee were enacted in 1972, directing the NSF "to initiate and support basic scientific research and programs

to strengthen scientific research potential and science education programs at all levels."

COUNTERATTACK AGAINST IMPOUNDMENT

In the early 1970's, the committee became progressively disturbed with the hardening administration approach toward impounding funds. In the 1972 floor debate, Symington warned:

I am breaching no confidence in pointing out that the committee seriously considered this year three separate methods for requiring the equal percentage obligation of funds in all line-item categories. We decided to hold up on any such procedure until we see how this year's funds are handled. Next year could be another story.

The committee was frustrated by the doubletalk received from the other end of Pennsylvania Avenue whenever the issue arose on how best to maintain NSF's traditional role in support of science education. The administration argued that the employment market did not justify the previous levels of support for science education, and that scarce funds should be funneled toward project research. In vain, the committee underscored its faith in enriching the wellsprings of future scientific strength through education and basic research.

After the 1972 Presidential election, more ominous signs appeared to shake up the advocates of science. NSF Director Stever, in addition to his other duties, was named the President's Science Adviser. Nobody viewed this as a promotion for Dr. Stever, or an upgrading of either NSF or science in general; it was correctly interpreted as a direct slap in the face for science. As described in chapter XIII, the White House move triggered a three-year committee fight to restore the science machinery which had been established at the highest level by President Eisenhower. It also sparked renewed committee activity aimed directly at the impoundment of NSF funds.

Early in 1973, Chairman Davis began laying the groundwork for action. He pointed out to the subcommittee that over 50 percent of the money for institutional support, graduate student and science education improvement was still impounded. As the committee prepared to go into its 1973 budget hearings, Davis labeled this action as "unwarranted," and vowed to draft "stringent legislation" to combat it. He also warned Dr. Stever in a January 26, 1973, letter:

The upcoming authorization hearings are going to be difficult and confrontations between Congress and the Foundation may be inevitable this year.

When the administration came up to Capitol Hill with an NSF bill which asked for \$70 million less than in 1972, Davis retaliated with a bill of his own which maintained the funding level and also attacked the impoundment issue. Davis explained his approach:

This is done by requiring that the percentage of funds actually obligated for any budget category must not differ by more than five percentage points from the percent-

age of funds actually obligated for any other category. * * * What it aims to do is maintain the relative priorities among programs as determined by the Congress.

THE SUBCOMMITTEE IN 1973

As the 1973 authorization hearings opened, the subcommittee included the following members:

Democrats

John W. Davis, Georgia, *Chairman*
 Richard T. Hanna, California
 Mike McCormack, Washington
 Don Fuqua, Florida
 Walter Flowers, Alabama
 William R. Cotter, Connecticut
 J. J. Pickle, Texas
 George E. Brown, Jr., California
 Ray Thornton, Arkansas

Republicans

Alphonzo Bell, California
 Marvin L. Esch, Michigan
 John B. Conlan, Arizona
 Stanford E. Parris, Virginia
 Paul W. Cronin, Massachusetts
 James G. Martin, North Carolina



A vigorous supporter of the National Science Foundation, Representative Charles A. Mosher (Republican of Ohio) extends greetings to the Panel on Science and Technology at the invitation of Chairman Miller (left).

Although not formally listed as a subcommittee member, Mosher as ranking minority member of the full committee was an ex officio member of all subcommittees. He played an especially active role in the deliberations of this subcommittee.

On the opening day of the hearings in 1973, Pickle summarized the general scientific attitude:

There is a great feeling of uneasiness and apprehension, if not fear, among many scientists throughout the United States.

The battle within the committee over the NSF authorization was joined when Conlan, Parris, and Martin moved to hold the total authorization at the budgeted level, while making other adjustments in programs to give more emphasis to institutional and science education support. Conlan penned a memorandum to Davis on March 30, 1973, noting:

Hope this meets with your approval, as our Nation doesn't need any more inflation at this time.

Davis immediately responded that he shared their concern over inflation, but that the NSF budget was already far less than requested in 1972. Davis added:

This decrease should be compared to requested increases of almost \$1 billion for public assistance payments and an undetermined amount for aid to North Vietnam.

FUNDING THE NSF IN 1973

At this point, Fuqua introduced a compromise which was midway between the Davis bill and the budgeted level sought by Conlan's group. In the subcommittee markup, McCormack strongly supported the Davis funding level, but he and Bell agreed to support the Fuqua compromise if the level for RANN were increased. The conservative bloc traded for a few reductions in the Fuqua proposal, prompting Martin to muse at one point:

There is an arbitrary nature to this anyway, which I think forgives a certain amount of horse-trading.

The mood of compromise dominated the markup session, with Davis concluding:

There isn't any question about the mood of the country being one to economize wherever possible, and also it's extremely important that the credibility of this subcommittee be well established and preserved. It's got a good reputation now as having reasonable views on the amount of effort that ought to go into our scientific and technical effort in this country, and I want to preserve that reputation.

Fuqua added that his compromise effort was both an attempt to avoid a Presidential veto and to preserve the essentially important areas of NSF support for science.

IMPOUNDMENT BATTLE IN THE HOUSE

The thorny issue of impoundment was not easily settled. The full committee debated the question at length on three occasions. In

Chairman Teague's absence, Hechler presided at two full committee meetings in May and June, during which he threw a small monkey wrench in to the machinery by using a "slow gavel" to encourage full airing of the constitutional and policy aspects of impoundment. Hechler stated from the chair that he was concerned with fashioning a formula for the NSF legislation which would mesh with the strong Senate effort, led by Senator Sam Ervin (Democrat of North Carolina), to pass anti-impoundment legislation across the board. Somewhere along the line, the administration apparently sent a signal to several Republican members of the committee who voiced their concern that anti-impoundment legislation was a form of partisan attack. Wydler, Bell, Winn, Goldwater, and Camp then signed "Additional Views" appended to the committee report, sharply criticizing the effort to arrive at a compromise on the issue which had plagued the committee for three years. The "Additional Views" labeled the committee effort "arbitrary and ill-conceived," adding that the committee recommendation—

drastically alters the Foundation's program authority and responsibility; it affects the Foundation's relationship with the Administration; it presents the Foundation with difficult and unwieldy operational problems and complexities; and finally, converts a relatively small apolitical science agency into a political "guinea pig" to test a broad major issue of fundamental national concern.

The controversy bubbled over onto the floor of the House, where Wydler demanded a rollcall on the controversial impoundment provision, which remained in the bill by a vote of 238-109. The committee Republicans split 6-6 on the floor vote, with Mosher leading one camp and Wydler the other. The issue then became somewhat academic when the Senate during the battle in the conference committee refused to allow the provision to survive, lest it not conform to the general anti-impoundment legislation then pending.

The 1973 legislation also marked the first time the House had agreed to increase the RANN program. The cautionary efforts by the committee in the early 1970's forced NSF to get a tight hold on the management of the RANN program, insuring that the rapidly expanding funds were used for worthwhile projects and that the NSF not simply substitute its administrative umbrella for programs which more properly belonged to mission-oriented agencies. In 1973, the Senate and conference committee also voted for expanded funds for earthquake engineering and energy research in the RANN program.

NSF AND THE ABORTION ISSUE

1973 also marked the first major effort by "right to life" anti-abortion forces to use the NSF authorization as a vehicle for test roll-

call votes. Representative Angelo Roncallo (Republican of New York) offered an amendment to prohibit the use of any NSF funds for research "on a fetus which is outside the womb of its mother and which has a beating heart." Teague accepted the amendment, on the grounds that the NSF was not involved in funding any such research, which was more clearly the province of the National Institutes of Health. Although many Members complained that the amendment had little meaning on an NSF authorization, it was adopted by a rollcall vote of 188-73.

The conference committee in 1973 added a provision which strengthened one of the committee's oversight tools, by requiring NSF to keep the House and Senate authorizing committees "fully and currently informed" through quarterly reports concerning their future financial plans. It took some prodding by the committee to get NSF to conform to this provision, however.

IMPROVING OVERSIGHT OVER NSF

On December 21, Teague, Davis, Mosher, and Bell huddled in the anteroom to the main committee room to make battle plans for improving committee oversight through use of the reporting provision. In a 3-page "Dear Guy" letter, Teague asked Dr. Stever to shake up NSF procedures which had all too often notified the committee of actions too late for Congress to do anything about them. Teague cited several examples:

The decision to take the research ship *Eltanin* out of service (a decision which reached the crew of this oceanographic ship while south of Australia, which was only reversed after months of committee effort through the authorization legislation); the decision to reorient substantially the entire science education program; the decision to make notable changes in the RANN energy research program; the decision to initiate such new programs as the University Research Management Program.

Teague's letter went on to advise NSF:

In the future, the committee should be advised before similar changes, program initiatives or cancellations are made. Since the purpose of this is to enable the committee to express an opinion to you regarding such changes, notification should obviously reach us a reasonable time period before your own final decisions are to be made.

Teague further asked the NSF to supply the committee each year with a full copy of its budget request in each category presented to the Office of Management and Budget, a practice which the Atomic Energy Commission had followed for many years with the Joint Committee on Atomic Energy. The information from NSF was readily forthcoming, and did serve to sharpen the committee's oversight ability once the process was working more smoothly. It is interesting

to note that it took a good deal more prodding, however, before NSF fully entered into the spirit of the free exchange of information. For example, NSF's second quarterly report in January 1974 was entirely devoted to historical events of the past and made no mention of currently pending and future policy issues to be resolved. NSF even balked at coughing up details of its budget request to OMB, protesting that "as a result of the continuing negotiations between OMB and NSF, there is more than one budget." This burning issue was resolved by advising NSF that all the committee wanted was the first budget request. It was like pulling teeth.

TALKING WITH THE OMB

After several years of mutual sniping between Congress and the Office of Management and Budget, the committee joyfully welcomed the chance in late October 1973 to accept OMB's invitation for an informal meeting on Capitol Hill to exchange information on budget priorities. Teague rounded up his subcommittee chairmen and ranking minority members in the Speaker's dining room in the Capitol. Pending the arrival of OMB Director Roy Ash, who was 20 minutes late, John C. Sawhill, Frederick Malek, and Hal Eberle of OMB presented their future plans. They stated that inflation would only be controlled by a balanced budget, and where did the committee propose to cut its own programs and which were more important? The meeting, which started out with the beautiful anticipation of young love on the note that "I'll tell you my secret if you'll tell me yours" soon sunk into meaningless generalities. For example, the committee expressed deep concern over the prospective decrease in the NSF budget, and the importance of maintaining strong educational programs in science and an active basic research effort. OMB wanted to know which was more important, NSF or certain NASA projects desired by the committee? The committee declined to get drawn into this kind of argument, and the meeting broke up with little hard information or meeting of the minds on any substantive issue.

THE NSF IN 1974

In 1974, the NSF budget shot up over \$100 million to \$788 million—an increase from \$646 million to \$788 million. The lion's share of this increased budget went to RANN—virtually doubling from \$75 million to \$149 million, largely as the result of expanded energy projects. During the hearings, various subcommittee members expressed an old concern that in the interests of being "fashionable," NSF was placing too small an emphasis on education and basic

research in order to fuel another dramatic jump in energy research through the RANN program. In the subcommittee markup, Mosher put it this way:

Back in 1970, science education was 36 percent of the NSF budget. And in the current proposal, it is only 10 percent. There has been a steady reduction in emphasis on science education. * * * RANN has precipitously increased. And by some coincidence RANN has increased just about exactly the same amount, percentagewise as science education has decreased. * * * These are trends which I consider to be mistaken.

Mosher, Davis, and others reiterated that they supported RANN, and that to transfer some of its whopping increase to science education support might actually help both programs. Bell strongly and vociferously opposed any tampering with the RANN budget, despite the fact that NSF had asked OMB for only \$82 million, and it was OMB's action which had hiked the level for RANN to \$149 million. Mosher proposed less than that for RANN, but preserving a 90-percent increase over the prior year. Bell argued within the subcommittee, the full committee, and on the floor to support NSF's energy research to the full extent of the budget; the argument boiled down to \$149 million versus \$139 million. Bell stated:

Energy is what we are talking about. That is what we have been talking about for the last year. * * * I think that is the one thing in this Nation that people recognize today that you can sell, the effort toward making ourselves self-sufficient and supplying ourselves through research in such things as solar energy.

Davis, Mosher, Fuqua, and Esch teamed up to defeat the Bell amendment on the floor, largely on the basis of Mosher's argument that energy research would need the trained manpower which increased emphasis on science education would produce. The heated argument proved rather academic, however, as the conference committee restored the entire budgeted amount for RANN—\$149 million.

GEOGRAPHIC DISTRIBUTION OF NSF FUNDS

During the 1974 debate, Flowers renewed an argument he had frequently made both in committee and on the floor:

Certain institutions in certain states continue to receive the lion's share of the National Science Foundation's grants. It seems to me that NSF has a definite obligation to see that these awards are distributed more equitably across our Nation. I am not persuaded that quality research people and institutions deserving of grants and contracts are located only in those few areas now receiving special attention.

The efforts which Flowers made, as with prior efforts directed at wider geographic distribution of NASA expenditures, furnished the subject of much serious debate and conferences within NSF. Aside from some token exceptions, however, the net results continued to

show that those institutions and geographical areas which were already benefiting continued to do so. It was difficult to argue with quality, experience, and availability of good proposal-writing personnel who knew how to hone the keys to the strongbox. There was a great deal of agonizing, along with lip service given by NSF officials to support the general principle that NSF funds generated greater ability in certain areas to obtain more funds. But in the case of larger contracts, NSF did little better than NASA in effecting a wider distribution geographically. It was always easy within the privacy of the executive branch to defend the "national interest" against the "parochial" assaults of "pork barrel politicians."

SYMINGTON BECOMES SUBCOMMITTEE CHAIRMAN

At the start of 1975, the subcommittee had a new chairman. The defeat of Davis in the 1974 Georgia Democratic primary resulted in his replacement by Symington, who moved up from his prior position as chairman of the Subcommittee on Space Science and Applications. It was Symington's last term in Congress, as he chose to run for the U.S. Senate in 1976. It was unfortunate that a man of Symington's dedication and ability should have thrust on him the responsibility for handling a messy inquiry into a NSF-funded project: MACOS ("Man: A Course of Study").



Representative James W. Symington (Democrat of Missouri), right, receives the National Science Foundation Distinguished Public Service Award from NSF Director Dr. Richard C. Atkinson on December 15, 1976. Representative Moshier received a similar award on the same occasion.

As the 94th Congress opened in 1975, the following were assigned to the Symington subcommittee:

<i>Democrats</i>	<i>Republicans</i>
James W. Symington, Missouri, <i>Chairman</i>	Charles A. Mosher, Ohio
Don Fuqua, Florida	Marvin L. Esch, Michigan
Walter Flowers, Alabama	William M. Ketchum, California
Mike McCormack, Washington	David F. Emery, Maine
George E. Brown, Jr., California	
Ray Thornton, Arkansas	
James H. Scheuer, New York	
Tom Harkin, Iowa	
Jim Lloyd, California	
Christopher J. Dodd, Connecticut	
Tim L. Hall, Illinois	
Robert (Bob) Krueger, Texas	
Marilyn Lloyd, Tennessee	
Timothy L. Wirth, Colorado	

It was the largest number of members—18—in the history of the subcommittee.

On January 24, the year started innocently enough with Symington announcing oversight hearings on the NSF science education. He expressed concern over the reduction in science education support over a 10-year period, from \$120 million down to \$74 million, at a time when the total NSF budget was increasing about 60 percent. In opening the hearings, Symington also called attention to the reorientation in emphasis:

Funds for fellowships, summer institutes, and similar activities have been cut back, while research and development activities, such as curriculum development, have been allowed to grow.

NSF EDUCATION PROGRESS IN 1975

In a special report to the committee by the NSF entitled "The Future of the National Science Foundation's Education Programs," the NSF identified the following problems:

- Increasing the number of women and minorities in scientific and engineering careers;
- Maintaining the vitality of the Nation's science faculty in the face of decreasing enrollments and fewer employment opportunities;
- Providing engineering and scientific manpower for emerging needs such as energy, resource development, materials, productivity, and food; and
- Increasing citizen understanding of science as society is increasingly involved in decisionmaking on scientific and technological alternatives.

Testimony by Dr. Lewis S. Salter, executive vice president of Knox College in Galesburg, Ill., documented the effect of subcommittee actions in the science education field. Dr. Salter presented a chart to indicate "the systematic drive to eliminate from Foundation support all science education programs of essentially sustaining type." He then added:

Without the action of Congress, and specifically of this subcommittee, each of these particular programs might now be extinct.

Dr. Salter suggested that the NSF had been forced to adopt a crisis approach and response to national problems, which resulted in a lack of stability and predictability in scientific education.

Academia did not always produce the best communicators. One educator rambled on about Piaget psychology, creativity development, and "hands-on approaches to teaching." This was too much for Symington, who puckishly asked the witness:

Before I get to the serious questions, I note you refer to a hands-on approach to teaching. Is that spanking?

Chairman Teague on February 5, convened the full committee to receive a general briefing from NSF Director Stever, as well as the Chairman of the National Science Board, Dr. Norman Hackerman. In the briefing Dr. Stever defended reductions in science education funding by noting that "our first priority, under difficult budget constraints, is to maintain the strength of the research enterprise."

Mosher reminded Dr. Stever:

I have reviewed the public law—in fact, I have it here in front of me—certainly there is nothing in the public law that says the Foundation has a priority greater for basic research than it does for support of science education.

Dr. Stever cleverly ducked the issues with the observation:

I agree. We have several children, and it is as hard to talk about who is your favorite child, as it is to assign a priority in this instance.

CONLAN ATTACKS MACOS

As the briefing drew to a close, a member of the full committee, Representative John B. Conlan (Republican of Arizona), raised an issue which ballooned into a bitter debate within the committee, within the Congress, and to some extent within the Nation. NSF was clearly on the defensive in having funded a program which suddenly became controversial largely through Conlan's efforts: MACOS.

Conlan started out rather mildly, mentioning the dozens of adverse telegrams he had received from concerned parents. He indicated that the anthropology course for fifth- through seventh-grade students, centered on social habits and practices of the Netsilik Eskimos and

certain animals contained "predominant emphasis on sex, pragmatic attitudes about respect for life, shocking film segments displaying gore and immoral acts * * * ." Dr. Stever stated that the program package, developed through NSF funding in prior years, was being used in 1,725 schools but there were no funds in the NSF budget in 1975.

During the four days of extensive budget authorization hearings which the subcommittee subsequently held during February, neither the subcommittee, nor any witness, nor NSF, brought up the subject of MACOS. When the subcommittee met for its markup session on February 27, MACOS was also not mentioned, as the subcommittee spent most of its time voting for and beefing up NSF support for science education in general. The subcommittee decided it was high time to put its foot down on NSF's decision to stress innovations in science education, at the expense of downgrading the traditional method of sustaining support for general science education. The subcommittee hiked the amount for science education support from \$70 million to \$90 million, but even more important set up two categories—innovative and general sustaining support (the latter including upgrading equipment, undergraduate research participation, secondary school student science projects, and science faculty fellowships). As Symington explained to his subcommittee:

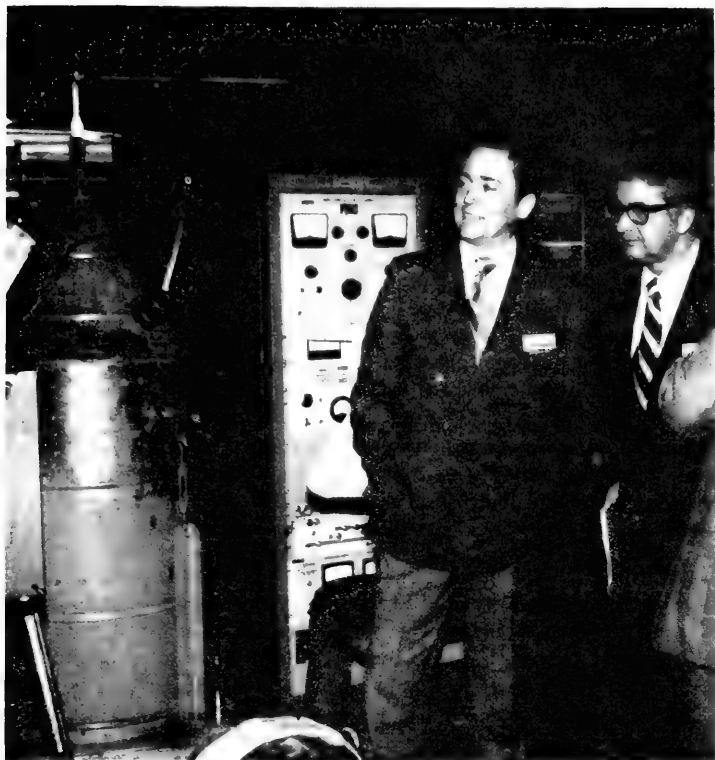
The witnesses almost all seemed to feel that science education ought to remain at a level commensurate with the increase in basic research, so that you don't have research getting way out in front and nobody coming up into the stream prepared to support that level of research.

GEOGRAPHIC DISTRIBUTION IN 1975

The subcommittee also tackled an issue which, year after year, was raised by Flowers—the overconcentration of NSF research funds in research-rich States like California and Massachusetts, with consistently low results for many States in the Deep South:

Maybe I am batting my head against a stone wall. I have been doing this thing for 3 or 4 years, and I keep thinking maybe I might be getting somebody's attention. I want to be good-natured about this thing, but I want to see some results too.

In 1975, Symington insisted that the subcommittee recommend strong language in the report emphasizing the need for wider geographic distribution, in accordance with the terms of the amended NSF act of 1968, admonishing NSF "to avoid undue concentration." The committee views in the authorization bill stressed this point, and faulted the NSF for failing to take the legislative language into account. But despite reiteration of the firm congressional intent, there was very little affirmative action demonstrated by NSF in carrying out the intent of Congress in this respect.



Although not a member of the Science, Research and Technology Subcommittee, Representative John B. Conlan (Republican of Arizona), left, stirred up a hornet's nest when he attacked the National Science Foundation-funded MACOS program. At right is Representative Marvin L. Esch (Republican of Michigan).

CONLAN'S STRATEGY

Congressman Conlan had a good sense of timing and public relations. He realized that he could not win his argument on MACOS through logic alone. He was very adept at using the news media, speeches on the floor, and letters to his congressional colleagues to stir emotional anger in the public mind concerning what he termed bestiality, immorality, incest, wife-swapping, infanticide, geronticide, murder, and cannibalism portrayed in the federally funded course of books and films for fifth to seventh graders. When the full committee met on March 6 to mark up the NSF authorization bill which the Symington subcommittee had unanimously approved, Conlan threw an incendiary bomb into the full committee's deliberations with an amend-

ment to cut off all funding "directly or indirectly for further development or implementation of *Man: A Course of Study*, MACOS." The amendment split the committee squarely down the middle. Chairman Teague and several Democrats spoke for the Conlan amendment, but the bulk of the support came from the Republican side. With the exception of Mosher, who both spoke and voted against the Conlan amendment, there was solid Republican support for Conlan's position. A test vote to table the Conlan amendment failed by 17 to 12, but after some acrimonious discussion the amendment was defeated by the narrow margin of 16 to 13.

Teague was upset that Symington had not conducted thorough oversight over the controversial MACOS program. There were plenty of red faces in NSF as they saw their *laissez-faire* review machinery engendered a hotly emotional backlash. For NSF to have edited out a few of the glaring items which incited the most opposition would have been out of character for educators trained in freedom of expression. After all, couldn't teachers and school boards decide what was best for their own areas in course materials?

TEAGUE AND MACOS

Hoping to avoid another bruising battle on the House floor, on March 12 Teague filed the bill for consideration by the House. Teague took several steps to air the issues involved. He pointed out to Dr. Stever that the high Federal investment in MACOS made it unfairly competitive with other courses developed by private enterprise, not to mention the highly objectionable features which Conlan had cited. He also announced his intention to appoint a committee-sponsored independent review group to look at MACOS and make recommendations. When Conlan protested that he wasn't getting much cooperation from the NSF in obtaining a complete set of the films and curriculum materials, Teague let out a roar which shook NSF literally to its foundations. Not only were the materials quickly supplied, but Teague set aside Rayburn Building committee rooms for members to view six hours of films and pamphletary material. Although some committee members grumbled that this put them in the position of becoming censors, most members took advantage of the opportunity to see the entire program in context.

By mid-March, Conlan's publicity efforts were stirring up mail to Congressmen both on and not on the committee. As Teague moved around the floor and paid his regular visits to the House gymnasium, he began to get pointed complaints from many Members about the allegations. It became more and more apparent that if the bill went

to the floor under these circumstances, Conlan would offer an anti-MACOS amendment and there would be a divisive fight which might even defeat the NSF bill.

A pragmatic man, Teague took a drastic move to try and minimize the serious opposition. After consultation with the House Parliamentarian, with subcommittee Chairman Symington and with Mosher, the ranking Republican on the committee, Teague arose in the House on March 17 and obtained unanimous consent to have the NSF bill recommitted to the committee. Then he immediately called a full committee meeting for March 19. Each committee member was given a copy of a 4-page letter from Dr. Stever, indicating that he was withholding any further support from MACOS "and any other precollege science course developments" until a thorough review by "a top-level group" inside and outside NSF.

MACOS DEBATED IN FULL COMMITTEE MEETING

Ottinger protested the hearing itself on these grounds:

I find myself deeply concerned about this hearing because I think it evidences an intent of us as Members of Congress to try to censor the content of a program that we have authorized, and I think that is an inappropriate action for us to take. * * * This seems to me an idea which tramples on the First Amendment of the Constitution.

Wydler shot back:

I find that an amazing statement. We are going to provide money, it seems to me, and we have some responsibility how it is spent and what it is spent for. I keep assuring the people of my district I will try to maintain some oversight as a Member of Congress on how the money is spent. That is their money, and I intend as long as I am here to do this, whether it is called censorship or anything else.

Teague recognized Conlan, who savored a victory of sorts:

Mr. Chairman, apparently since our last meeting there have been some substantial second thoughts in the National Science Foundation, as to the program in question, as to the qualification and granting of funds to their entire social sciences educational grants -and not to mention this specific educational program.

During a colloquy with Symington, Conlan indicated that he would wait to see what the National Science Board did with the MACOS issue before making up his own mind whether or not to offer a MACOS amendment on the House floor. It was a clever move, because Conlan knew he could focus more national attention on a floor fight rather than a committee fight.

Myers offered an amendment to require NSF to inform local communities through public notices and offer for public inspection materials which might be used in connection with such courses. The committee rejected the amendment on the grounds that this involved

Federal interference in the local educational decisions of elected school boards. Fuqua remarked, with reference to his home area in Florida:

This is a responsibility of the local school administrators—and I have talked with the School Superintendent there—there was some question about this program, and he appointed a 24-member lay committee made up of parents, clergy, business, and other segments of the county. They reviewed this with the students and teachers, and voted 23-1 to recommend that the program be continued, so they have.

So far as the independent committee review was concerned, Teague commented that the committee did not have money to hire outside review authorities, which left Symington wondering how the issue would ever be resolved. Toward the end of the hearing, this brief exchange occurred:

Mr. TEAGUE. The Chairman has just been informed we have \$25,000 in the committee for consultants.

Mr. SYMINGTON. Thank goodness the cavalry has arrived.

THE FLOOR FIGHT OVER MACOS IN 1975

When the NSF authorization bill was finally taken up on the House floor on April 9, 1975, very few Members paid much attention to the wide-ranging accomplishments of the National Science Foundation in pushing forward the frontiers of research in physics, chemistry, mathematics, biology, materials, oceanography, astronomy, and the Earth sciences; the role of the NSF in stimulating new products, new processes, and new applications; the work in fostering international cooperation; the pioneer work in energy which was being turned over to the new Energy Research and Development Administration; the development of science education, and the many other areas in which NSF took the leadership in keeping American science and technology strong. On April 9, 1975, everybody's attention was focused on one small program involving a minuscule portion of the \$755 million NSF budget: MACOS. And even that had no budgeted funds for 1975.

Mosher was the first to bring up the subject during general debate. He mentioned that one of the reasons the controversy had arisen was that the committee had in past years been disturbed at the fact that NSF had not been aggressive enough in getting curriculum materials out to potential school users, once money had been spent on their development. The committee felt it was a waste to let these materials just sit on the shelf without being actively used. Mosher then explained:

The controversy this year arose as the combined result of first, NSF pursuing the committee-recommended policy relating to implementation, and second, the implementation of somewhat controversial subject matter.

When it came time to consider amendments, Conlan immediately offered a somewhat different amendment than he had in the March 6 committee meeting to ban funds for MACOS. His April 9 amendment

required that before any funds could be released to NSF, comparable House and Senate Science Committees had to be furnished with all curriculum materials for NSF-funded courses, and then both the House and Senate had to adopt affirmative resolutions authorizing the "implementation or marketing" of such courses. Conlan explained that he and other Congressmen had been "inundated with outraged complaints from parents nationwide" about MACOS. He described his amendment as necessary "to stop what is shaping up as an insidious attempt to impose particular school courses and approaches to learning on local school districts—using the power and financial resources of the Federal Government to set up a network of educator lobbyists to control education throughout America." Summarizing his objections to MACOS, Conlan told the House:

MACOS materials are full of references to adultery, cannibalism, killing female babies and old people, trial marriage and wife-swapping, violent murder and other abhorrent behavior of the virtually extinct Nersilik Eskimo subculture the children study. Communal living, elimination of the weak and elderly in society, sexual permissiveness and promiscuity, violence and other revolting behavior are recurrent MACOS themes

Mosher responded:

This is a course in anthropology. It is an effort to tell young Americans something of the way other people live in their civilizations. The materials to which the gentleman from Arizona (Mr. Conlan) refers have to do with the customs and the mythology of the Eskimo tribes. There is, in my opinion absolutely nothing in these materials that cannot equally be found similarly in Grimm's Fairy Tales and in Aesop's Fables, scattered throughout the Bible, in the Odyssey, and in many of the traditional stories that are so familiar to us and in the lives of the pioneer farmers, the basic civilization in which we are rooted.

Teague defended Conlan's position:

The gentleman from Arizona, in my opinion, did this Congress a great service in what he has done. I argued for his amendment in committee, and I voted for his amendment. * * * I do not consider this censorship at all. Every Member of this House has oversight over everything we pass in this Congress. I do not want my grandsons and daughters seeing the kinds of things that come out of this.

Symington defended the content of MACOS and challenged the procedure of the Conlan amendment:

What the amendment does is to make of the Committee on Science and Technology and the Committee on Labor and Public Welfare of the Senate a joint committee on censorship to determine the validity, the usefulness, the propriety of curriculums of educational programs developed by the National Science Foundation. * * * There is no more democratic institution in the country than the school board. * * * Hundreds of school boards and hundreds of schools are using this particular program known as MACOS, and we have testimonials, as thick as those of the gentleman from Arizona, on behalf of that program of education as one which does acquaint youngsters with social conditions that are characteristic of tribal life.

Wydler disagreed:

The fact of the matter is that what we are talking about here is the spending of Federal tax dollars. That is the issue. That is not something that the school districts are doing; it is something that the Federal Government is doing by taking Federal money and spending it to produce certain results, and then selling that to the school districts, and making a value judgment in that process.

Ottinger pointed out:

I assure the members that the Holy Bible would never pass muster under the kind of demagoguery in which my friend the gentleman from Arizona is engaging because in the Holy Bible there is murder—indeed murder of brother against brother, Cain against Abel.

Mrs. Lloyd presented this analogy:

If we found our school lunch programs dilatory in providing wholesome food for our children, what would we do? We would move promptly to see that the problem was eradicated. In the same way, I think we must examine these education programs; to look into the food for children's minds.

Wirth stated:

What is at issue here is not what we choose to teach our children, but whether we have a choice. I believe very strongly that program decisions of this kind should be made on the local level. By continuing the MACOS authorization we are not requiring any local school board to adopt it. We are giving them the opportunity to select it.

HOUSE NARROWLY DEFEATS CONLAN AMENDMENT

The debate was hot and heavy, with the committee splitting a little more along partisan lines and coming down more strongly against the Conlan amendment than they had in the committee vote on March 6. The Conlan amendment was rejected by the House, 216 to 196. Committee Democrats voted 22 to 3 against the Conlan amendment, while committee Republicans split 8 to 3 in support.

The aftermath of the MACOS fight on April 9 was still another serious fight. The committee discovered immediately they were not out of the woods yet. Representative Robert E. Bauman (Republican of Maryland) offered an amendment requiring NSF to transmit to Congress every 30 days a list of proposed grants, which could not become effective if either House disapproved of any of them by resolution. Bauman had a field day describing silly sounding projects, even though some of them (as Mosher pointed out) were funded by agencies other than NSF. Bauman argued that this authority was necessary for Congress to exercise oversight, and not simply pass the buck to "some bureaucrat." Symington and Mosher stated that it would be an intolerable burden for the Congress to read and pass on 14,000 to 16,000 NSF grants per year. The Bauman amendment passed by the narrow margin

of 212 to 199, but was subsequently knocked out by the conference committee.

The controversy stirred by the Conlan and Bauman amendments was by no means ended by passage of the authorization legislation in 1975. In addition to the citizens committee appointed by Teague and the NSF Review Committee, the Science Committee also asked for studies of the administration and development of MACOS by the General Accounting Office, and the Congressional Research Service. The citizens committee which Teague appointed was chaired by Dr. James M. Moudy, chancellor of Texas Christian University, and included such people as former Congresswoman Edith Green, Gerard Piel (publisher of the *Scientific American*), Mrs. Clare W. Schweickart (wife of Astronaut Russell L. Schweickart), and former NASA Associate Administrator Rocco A. Petrone.

PEER REVIEW

As the reports of the various review committees began to come in, the Symington subcommittee held another extensive series of hearings on the entire NSF "peer review" system during July 1975. During six hot summer days, a parade of witnesses raked over the pros and cons of the NSF review system to which very few people had paid any attention, other than the grant applicants and their reviewers. Congressmen Conlan and Bauman appeared as the principal critics of the system, and they called seven other witnesses. Four NSF witnesses were supplemented by ten scientific experts picked by the subcommittee from outside the NSF.

Conlan's attack was slashing. He told the subcommittee:

It's no trick to rig the system, I know from studying material provided to me by NSF that this is an "Old Boy's System," where program managers rely on trusted friends in the academic community to review their proposals. These friends recommend their friends as reviewers. * * * I submit that the Congress—its Members and staff—can only decide whether public funds are being handled judiciously and fairly in the NSF grant awards process if we have total access to peer review files and the full rationale for program managers decisions. * * * It is an incestuous "buddy system" that frequently stifles new ideas and scientific breakthroughs, while carving up the multimillion dollar Federal research and education pie in a monopoly game of grantsmanship.

There were some eloquent responses to Conlan. NSF Deputy Director (later Director) Richard Atkinson told the subcommittee:

I do feel that the maverick in our system, the person who really has an idea that is counter to what most of the scientific community believes, is going to receive very special treatment in our system. If anything, I think our system leans over a little too far in the direction of trying to favor the maverick.

Congressman Harkin made these extemporaneous remarks during the subcommittee hearings:

Philosophers have dreamed for centuries of a country, of a Nation, where freedom of thought, inquiry of any nature would not be subject to the political pressures of the monarchy or dictator. I feel whenever inquiry and freedom of thought is placed beyond the realm of the politician, then that country acquired a spiritual strength that makes it, in fact, a beacon of liberty in the world. That is what I want to protect. I don't want to become another Soviet Union or China, where all scientific thought is dictated, where people are channelized into their programs. I want freedom of—whatever nature, social sciences, hard sciences—freedom to inquire and to challenge, the freedom to challenge the most deeply rooted belief that people hold. Only by doing that can people really change and grow.

THE MOUDY REPORT ON MACOS

In October, the Moudy report was released, endorsed by seven of the eight panel members. A key to the cause of the controversy is contained in these conclusions:

MACOS is undoubtedly an extremely powerful course. As with any powerful tool, there exist possibilities for advantageous use and for misuse. * * * Only a patient, skilled and perceptive teacher can handle value-laden materials and topics in such a way as to avoid telling the student what he should think, to cause the pupil to think for himself, and to cause the student to respect his own views, his parents' views, and the views of others. A course such as MACOS confronts the unsophisticated, malleable, pre-pubertal youngster with an array of some of the most painful decisions mankind ever faces. We compliment the MACOS developers for insisting on special training for every MACOS teacher. * * * From reports reaching us, we believe that the surest success of MACOS has come in those schools where ample preparations were made, including conferences with parents to show them in advance the MACOS materials, and to explain the purposes and methods of the course.

The Moudy committee recommended that although NSF should continue precollege science curriculum development, there should be some changes in procedure. The report warned that neither NSF nor Congress could escape responsibility for the quality and content of curricula funded by NSF. It was recommended that parents be added to reviewing groups, that there be closer monitoring by NSF, and no favoritism policy in marketing subsidized materials. With respect to MACOS, it was suggested that NSF's "implementation" activities be ended, "except for regular processes of information dissemination and training programs in which more than a single curriculum is offered." It was further recommended that teacher materials include:

Statements cautioning teachers regarding their handling of cultural differences and contrasting value systems, with careful attention to honoring the diverse value systems of the homes from which their pupils come.

To shield local communities against being unduly influenced by the Federal Government, the Moudy Study Committee recommended that

initiative for using NSF projects come from local areas. The Moudy group stated:

Our members were unanimous that neither the Congress nor the NSF should attempt to dictate what is taught and where, and that neither should attempt to censor materials.

CONLAN AND THE ISIS PROGRAM

Meanwhile, Congressman Conlan was not idle. In a statement before the Symington subcommittee in July, he charged that irregularities has accompanied the award of grants to Florida State University, totaling \$3.3 million, for ISIS (Individualized Science Instructional System). Conlan's campaign quickly assumed national proportions. In a letter circulated by the thousands throughout the Nation, addressed to "Dear Concerned American", Conlan commented, on his congressional letterhead:

The battle I led to end the Federal funding of MACOS began when the Heritage Foundation, a non-profit research organization, published the facts concerning this shocking program. That battle was largely won recently in Congress. * * *

*However, the war against Federal intervention in our schools has only just begun. * * **

The education of our Nation's children is far too important to be left in the hands of government bureaucrats. Please send your tax deductible contribution today.

Conlan's charges on ISIS prompted Symington to ask for another GAO report. When the GAO reported on January 12, 1976, a number of management mistakes were ascribed to NSF. On the same day, Dr. Stever wrote Symington to outline the steps NSF was taking to comply with the Moudy report through improvement of internal administrative procedures, such as the participation of school administrators, teachers, parents, and other lay persons in project evaluation.

GAO REPORT ON ISIS

The GAO Report on ISIS disturbed Symington. Upon its receipt, he wrote a tough letter to Dr. Stever, demanding an early explanation:

Based on my examination of the GAO Report and preliminary subcommittee staff analysis, I am forced to conclude that representations given to the subcommittee by Foundation staff concerning the evaluation of ISIS and the report of the Science Curriculum Review Team (May 1975) are not entirely accurate. * * * I am greatly concerned about the findings of the GAO Report and will want to discuss with you steps to preclude the kinds of mistakes which apparently took place in the management of this project.

Dr. Stever immediately responded on January 19, 1976:

The conclusions in the report and your letter are indeed most disturbing, so much so that I have conferred in a special executive session with the National Science Board and with the other Presidential appointees at the Foundation. First, I want to assure you that we at the National Science Foundation are determined to improve

our performance and procedures and to minimize mistakes in the use of the grants award procedure. The importance of science to this Nation, the important mission of the National Science Foundation, and the pride which we have in our accomplishments demand that we do so.

1976 NSF AUTHORIZATION

On the eve of the opening of the 1976 NSF authorization hearings, the Symington subcommittee issued its final report and recommendations on the "Peer Review" hearings of the preceding July. The committee agreed that there was no method superior to peer review for judging the scientific competence of proposals. However, it was recommended that the NSF policies and procedures be reduced to writing and widely circulated to dispel the mystery or secrecy many people felt about the process. Although the subcommittee rejected Conlan's charge that peer review was an "incestuous 'buddy system'," there was a strong feeling that reviewers should not be "overused," or concentrated in certain areas. The subcommittee was firmly against Bauman's proposal that Congress review individual research awards. On the issue of geographic distribution of NSF funds, the subcommittee waffled:

There is division of opinion among members of the subcommittee concerning the desirability of requiring that the geographical distribution of National Science Foundation funds meet some standard of evenness. Some argue that the Foundation should support the best research wherever concentration it may be found. Others believe some degree of evenness should be required.

In the light of the failure of the subcommittee to come to any clear-cut conclusion or make any firm recommendation, it is no wonder that the National Science Foundation, as with NASA, completely failed to come to grips with the problem of wider geographic distribution of funds. Furthermore, the declining emphasis on science education—where it seemed easier to distribute grants throughout the 50 States—served to make the geographic distribution perhaps even more concentrated as the years went on.

In its efforts to put out the fires caused by the stir of the Conlan and Bauman amendments, the Symington subcommittee and its staff devoted a disproportionate amount of its NSF oversight time and effort to the science education field. In January and February 1976, when the National Science Foundation came up to Capitol Hill to testify on behalf of their annual authorization bill, the subcommittee had a chance to broaden out and consider the rich mixture of other programs being constructively carried out by the National Science

Foundation. The committee bill in 1976 totaled \$811 million for NSF, \$1 million below the budget request:

In presenting the 1976 program to the House, Teague stated:

The proposed * * * program strengthens basic research in all major fields of science. Additionally, the program gives emphasis to areas where research results are closely coupled to improvements in technology and economic productivity; it continues research in the polar regions and at five major research centers sponsored by the NSF; it strengthens major international cooperative research efforts in oceanography and the atmospheric and Earth sciences; it provides support capabilities in science policy and analysis

Symington pointed out that the increase in NSF's 1976 budget was due to the transfer of several basic research projects from other agencies to NSF, as had been developing ever since the early 1970's--such as the Air Force's old solar physics laboratory at Sacramento Peak, N. Mex. In addition, the decision of President Ford to withdraw Navy logistics support from U.S. operations in the Antarctic, and to give full responsibility to NSF to become the "U.S. Manager in the Antarctic" in order to "civilianize" that operation, served to increase the cost of NSF expenditures. The committee, despite a stormy year of controversy, voted a \$9 million increase in science education.

To bolster subcommittee staff support and to probe some of Conlan's charges, James Ratzenberger was detailed from the General Accounting Office. He assisted in following up investigations started in the GAO, indicating that misrepresentations by the NSF had turned up in the peer review of the ISIS program. Fuqua confirmed the fact that thorough investigation had given the ISIS grant recipient, Florida State University, a clean bill of health, and he added:

Maybe (NSF) grew too fast, and maybe it was our fault that we did not insist that certain management changes be made in their internal operations, which appears to have resulted in this problem in the Curriculum Development. I think that Dr. Stever has certainly done a good job in trying to correct this, and I hope that we will not have any more of these types of situations develop in the future.

"SILLY-SOUNDING" NSF PROJECTS

Fuqua also responded to a spate of criticisms of "silly-sounding NSF projects" by pointing out how easy it was to ridicule scientific experiments, such as the work of Joshua Lederberg, whose research "formed part of the bedrock on which our growing understanding of genetics is based"; Lederberg started out examining the sexual recombination of bacteria, which could be ridiculed as a study of "the sex life of germs." Fuqua asked:

And how about Charles Townes? He won the Nobel Prize for "molecular stimulation by electromagnetic waves in a resonator with positive feedback." If we

would have snickered at that one, we would have been wrong again. Because that led to the maser and the laser.

Bauman brought up the spending of \$70,000 "to study the smell of perspiration given off by Australian aborigines." Symington nailed this one on two scores: First, that the study was done by the Department of Defense and not the National Science Foundation; and second, that the study was designed to ascertain why aborigines did not sweat as heavily in hot weather. The results were designed to protect American soldiers against dehydration in the jungles of Vietnam. A committee-led effort helped defeat another Bauman amendment to the NSF authorization bill in 1976, which would have required NSF to furnish full supporting documentation on all grants or contracts to any Congressman within 15 days of any request. On the surface, the amendment sounded like a worthy "sunshine" amendment, but as Mosher pointed out in the debate it was designed to give a "hunting license" to Members wishing to make end runs around the Science Committee and undermine its oversight responsibility. Speaker Albert made one of his rare floor speeches against the Bauman amendment, pointing out that it would necessitate the hiring of many new employees to carry out the tasks required. Wirth indicated that the amendment would politicize the NSF funding process as unsuccessful applicants would petition their Congressman to review all recommendations, thereby destroying the confidentiality of the peer review process. Although Conlan was the only committee Republican to speak for the amendment, minority members on the committee backed the amendment 7 to 3; Ambro was the only Democrat voting for the amendment, which was defeated 257 to 136 on a rollcall.

Conlan then offered an amendment to kill the \$1.4 million authorized for precollege curriculum development and use the funds instead for summer school institutes for teachers of science and mathematics. Conlan charged that the teachers' guide for the material would "require children in the sixth and seventh grades to cooperate with class data banks where they gather material on the attitudes of their parents, politics, everything from their Zodiac signs to their medical history." Wirth responded that the program in question was thoroughly pretested with parents and teachers on review boards. He added:

There is a great distinction which must be made between surveillance and observation. *** The features which characterize science in the first place are observing, questioning, describing, speculating, interpreting, valuing, choosing, verifying, comparing and experimenting. If we eliminate these features entirely from science curricula, we are not teaching science.

Fuqua, Mosher, Symington, and Scheuer also spoke against the Conlan amendment, in support of which Conlan was the only speaker. Democrats Ambro, Mrs. Lloyd, and Milford joined seven Republicans on the

committee in support of the Conlan amendment, which was defeated 232 to 160.

SCIENCE FOR CITIZENS PROGRAM

Once the Senate had passed the NSF Authorization bill late in May 1976, the conference committee started a struggle which stretched over a 3-month period before full agreement was finally reached in September. On June 4, Symington and Mosher dispatched a 4-page letter to their conference counterparts—Senators Edward M. Kennedy (Democrat of Massachusetts) and Paul D. Laxalt (Republican of Nevada)—contending that the many new provisions added by the Senate perhaps should be considered in new legislation for these reasons:

Our proposal does not mean that we are opposed to all of the additional measures proposed in the Senate amendments. But we are seriously concerned because our Committee and the House have not had an opportunity to develop a legislative basis for these additions. We believe public hearings, and thorough analysis of the premises and policy bases upon which to make considered judgments, are required before the House could be expected to act on them.

Among the many new Senate amendments were a science for citizens program, special provisions for minority, women, and handicapped, an Office of Small Business Research and Development, and State science, engineering, and technology programs. The Senate initiative on funding citizen action stirred strong opposition among House conferees, particularly McCormack, who viewed the proposal as Federal funding of environmental activists to be accorded the status and handed the weapons to fight certain energy programs which he strongly advocated. McCormack told *Science* magazine that he considered it "appalling" that the Federal Government should subsidize groups to intervene against programs which the Government itself had authorized. McCormack stated:

The intervening groups are rubbing their hands and drooling over this.

As originally passed by the Senate, this provision earmarked \$3 million for the NSF to improve public understanding of public policy issues involving science and technology and also "facilitate the participation of scientists, engineers, graduate and undergraduate students in public activities aimed at the resolution of public policy issues having significant scientific and technical aspects." The program differed from run-of-the-mill public information or other NSF programs to educate or inform the public in this way: (1) Some public service internships were planned for scientifically trained individuals who would work directly with and supply scientific expertise to local citizen organizations, trade unions, or chambers of commerce; (2) forums, workshops, and conferences were organized to bring scientists and nonscientists

together to focus on problems like water waste management, health and energy, with an aim to provide accurate scientific information; (3) plans were laid for "Public Service Science Centers," to enable reliable scientific information to be made available to meet local needs. Initially, the position of the House conferees was that this provision should be carried out on an experimental basis only, that the funding should be cut to \$400,000, and that language should be removed from the legislation and placed in the committee report instead. Actually, the science for citizens program was not new. The authorization act passed in 1975 required the NSF to submit to Congress a plan for a science for citizens program, which was done in February 1976. But the plan proposed did not seem to have the same activist tone as what Senator Kennedy was advocating. Thus, the House conferees continued to object to the size and scope of the Senate-proposed program, and another joint Symington-Mosher letter on July 2 expressed this and other objections to the Senate conferees. The letter added:

We have considerable doubt about being able to take a conference report to the House which would contain a bill changed in very major ways from the bill passed by the House.

THE CONTROVERSY ESCALATES

The House and Senate staffs, as was customary, tried very hard to narrow the gaps between the House and Senate positions. The science for citizens program was symbolic. McCormack's concern was heightened by the activity of citizen groups in a public referendum in California on future construction of nuclear powerplants; would the science for citizens program help finance a proliferation of other efforts similar in character? A July 8 memorandum from Dr. Wells to Teague stated: "This could be a 'political thicket' that would make MACOS look like a picnic if it is not handled with care."

Another provision added by the Senate set up a new State science, engineering, and technology program authorizing \$8 million for grants to States to be further distributed by States to increase their "capacity for wise application of science, engineering, and technology to meeting the needs of its citizens." This was essentially a use of the revenue-sharing approach.

In calling a meeting of the House conferees for July 22, Teague commented:

The NSF authorization bill presents more difficulties than in any past year. The overall problem is that the Senate unilaterally changed the "rules" on what traditionally goes into an authorization bill for the NSF. * * * One measure of this is that the bill passed by the Senate has twenty-three pages to only six in the House-passed bill.

In general, the House conferees agreed to go along with the Senate's new ideas only if they were cut down to manageable size, and spelled out in clearly circumscribed language. The House conferees, and in particular McCormack, stood firm in their opposition to the science for citizens program in the size proposed by the Senate.

On September 1, Senator Kennedy telephoned Congressman McCormack in an attempt to reach a compromise which would break the deadlock. The House and Senate staffs developed new language which they presented as a possible compromise. McCormack, after consultation with the committee staff and House legislative counsel, advised Teague that the new wording would be acceptable only if additional language were included to prohibit grants to any lobbyist or person or group who was an "intervenor" before any Government agency. In a memo to Teague on September 1, McCormack added:

If Senator Kennedy is sincere about simply wanting to fund "Science for Citizens" programs or to provide "public understanding of science" then he would not object to our limitation.

McCormack added this personal background note to reinforce his firm position:

It is important to remember that Kennedy has more "goodies" in this bill than anybody else and that they are for his people to whom he is appealing in his reelection campaign. I don't think he will let the bill die and he certainly can't blame us if we send him a formal letter or make a public statement saying that we are ready to pass the bill either without this section or with this section and our amendment to it. That puts the monkey on his back and I feel convinced that he will cave in. We can easily be tough and sit here for two weeks, if necessary. It will only take us 5 minutes to pass the bill in both houses once we get agreement.

GIVE 'EM HELL, TIGER!

WHO WILL BLINK FIRST?

Senator Kennedy agreed to reduce the amount for this feature of the bill from \$3 million down to \$1.2 million, and to write severe limitations into the language of both the bill and the conference report explaining it. It was decided to incorporate language in the report prohibiting grants to lobbyists, but Senator Kennedy would not agree to including this in the law or to include the McCormack language barring funds to any intervenor. The conference remained deadlocked throughout the early days of September, and a meeting among Kennedy, Symington, and McCormack failed to break the deadlock. The situation on September 15 was described by Dr. Wells in a note to Teague:

The essence of the Science for Citizens Program disagreement is this: Mr. McCormack believes that no money, in any form, should go to lobbyists or intervenors;

Senator Kennedy believes that adequate safeguards were put into their most recent offer to deal with Mr. McCormack's concerns.

It is now a matter of seeing who "blinks first." Unless they—or we—move off of our present positions within the next few days, it will be difficult to get an authorization bill through before the end of the session.

Yeager followed up on September 21 by reporting to Teague:

Our last meeting of the House conferees on this matter was held September 1. At that time it was agreed to stand fast with Mr. McCormack's position for two weeks in the event that his suggested amendment was unacceptable to the Senate. The Senate is saying flatly that they will not go along with Mr. McCormack's amendment. Meanwhile, three weeks have gone by. * * * It is important for us to file our conference report before the end of this week.

The conference finally agreed on the NSF authorization language, with McCormack declining to sign the report. Mosher made this statement to the House during consideration of the conference report on September 29:

This science for citizens program will provide the seed money for recognized professional societies and groups to undertake special projects aimed at increasing the public's understanding of science, engineering and technology and their impact on public policies. * * * The conferees recognized that this program might potentially be skewed to support the activities of so-called zealot groups advocating particular views on topical issues. But, I assure all, that the science for citizens program certainly is not intended as a vehicle for those who have "an axe to grind." It is intended to increase public awareness and understanding.

The protracted fight over the issues in the NSF authorization, particularly the impasse developing on the science for citizens program, nearly killed the bill in 1976. The conference report was not enacted until two days before the end of the fiscal year and just a week before the adjournment of Congress. The delay revealed the bitterness of the fight over citizen access to government, the determination of some legislators, and the fear of others to extend that process.

THORNTON BECOMES SUBCOMMITTEE CHAIRMAN IN 1977

With the convening of the 95th Congress in 1977, the Subcommittee on Science, Research and Technology had its fourth chairman during the decade: Representative Ray Thornton (Democrat of Arkansas). The size of the subcommittee went down from 18 in the prior Congress to 10 in the 95th.

Democrats

Ray Thornton, Arkansas, *Chairman*
 Don Fuqua, Florida
 Tom Harkin, Iowa
 Robert (Bob) Krueger, Texas
 Ronnie G. Flippo, Alabama
 Mike McCormack, Washington
 George E. Brown, Jr., California

Republicans

Harold C. Hollenbeck, New Jersey
 Robert K. Dornan, California
 Edwin B. Forsythe, New Jersey

Even before Chairman Thornton had a chance to call an organization meeting of his subcommittee, Fuqua presided over a meeting of the full committee on February 1 to kick off the 1977 NSF authorization hearings. While Chairman Teague was undergoing major surgery at the Bethesda Naval Hospital, his committee in his absence was already swept up in the whirlwind activity to get a big authorization bill to the House floor by mid-March. President Carter's new agency heads quickly discovered that the Science Committee was in no mood to sit back passively and swallow everything fed to them across the witness table. Acting NSF Director Dr. Richard C. Atkinson referred on February 1, 1977, to NSF's efforts to strengthen science education, but was somewhat startled to have Congressman Brown tartly observe:

We have a little language difficulty still it seems to me. For example, you stressed the fact that science education continues to receive strong support and so on. Yet the dollar figures you give show a 1.9 percent increase for science education, which is actually a real loss when you compare it to the overall impact of inflation. * * * I think that you should give us the picture in real terms and not try to obfuscate it by the statements you make.

ORGANIZATION MEETING OF THE THORNTON SUBCOMMITTEE

On the afternoon of February 3, Thornton assembled his subcommittee to take a long look at the challenges which faced them in the two years ahead. When the Science Committee was established in 1959, the National Science Foundation was working with an appropriation of \$136 million; the task of the Thornton subcommittee was to examine an annual budget which by 1977 had risen to \$885 million. Squeezing out the annual inflation rate, at that time estimated at 6 percent, one of the issues was just how fast NSF should grow, and how its mission of strengthening the basic scientific research and education of the Nation could best be accomplished. As Thornton outlined to his subcommittee, this involved all kinds of decisions, such as the perennial question which Brown had raised at the February 1 hearing concerning the proper emphasis on support for science education—an issue which always found the Science Committee placing it at a higher priority than NSF. A new question facing the subcommittee was how much should NSF contribute toward "indirect" (overhead) costs, which had risen from the 1966 rate of one-sixth of research grants up to a startling one-quarter. To many Members of Congress, looking for places to cut out fat, this was a very proper area for rigorous oversight. A host of other NSF-related decisions faced the subcommittee, all the way from how much to allocate to earthquake research to how to resolve a longstanding dispute with the Civil Service Commission over the grade ratings for technical, professional, and managerial personnel. Politi-

cally touchy questions like peer review, precollege curriculum development (the aftereffects of the MACOS brouhaha), and the future of the science for citizens program had to be faced squarely, and would not go away. Other questions discussed at Thornton's organization meeting were how to continue progress toward NSF-inspired improvement of education for minorities and the handicapped, how should the relation of NSF develop toward industry and profitmaking organizations (through the RANN program), what was the appropriate role of the NSF in stimulating basic research in mission-oriented Federal agencies, and what should be the future role of NSF in most effectively supporting international objectives.

THE SCIENCE FOR CITIZENS PROGRAM IN 1977

After the customary round of public hearings during February, the Thornton subcommittee assembled for its markup session on March 2. Generally, the subcommittee decided to reduce NSF's overall budget request by 5 percent, but increase the support for science education by 10 percent. A fight erupted in the subcommittee over the science for citizens program, with McCormack leading the forces who wanted to cut the NSF budget request from \$1.2 million down to a mere \$100,000, and Harkin advocating full support for the program. McCormack told his colleagues:

The danger lies in the fact that lobbying groups, intervenor groups will try to get the money and use it for their purposes. * * * And I think it makes good sense that the Federal Government should not be funding (lobbying groups) in the guise of educating the public in the field of science.

Harkin responded:

One thing that I feel all the time as I go out and talk to citizens and citizen groups, as I did in my recent trip to the West Coast, that what the scientists are doing and what they are thinking and saying is not being translated to the average citizen. Because we live in a democratic society where those citizens make the ultimate decisions, they ought to know, they ought to have the basic scientific input to be able to make reasoned judgments and decisions.

Harkin added that all the witnesses appearing before the subcommittee had testified in support of the NSF budget request, justifying the authorization. In rebuttal, four staff members intermittently supplied information that \$100,000 was all that was needed for a late-starting program which needed evaluation before it should proceed. Chairman Thornton expressed a "grave concern if that funding becomes available for intervenors." With an obvious recollection of the MACOS fight, Fuqua added:

The National Science Foundation has been embroiled in controversy over some other programs. And I think they do a very fine job and in the academic and scientific

community they are really respected and I want to see them maintain that respectability. When they get involved in controversial areas, issues that are highly inflammatory and emotional, then it embroils the Foundation in areas that I question whether they should be involved in or not. And also I think it damages the fine work that the Foundation has been doing over a long period of time.

Harkin was faced with a solid phalanx of opposition. He pointed out that the Senate was funding the program at a \$5 million level, and remarked: "So we are going in totally the opposite direction." This prompted a brief exchange with McCormack:

Mr. McCORMACK. We will guide them in the conference committee.

Mr. HARKIN. I do not know about that.

Defeated in subcommittee, where he stood alone, Harkin brought his fight to the full committee where he had more support, but not enough. In the full committee markup on March 9, Harkin offered an amendment to increase the science for citizens program from \$100,000 to \$1.2 million, the budgeted request. Harkin argued:

Many of the decisions that are being made in the area of science and technology, being made by scientists, drastically affect the lives of every citizen in this country. To say somehow that those citizens should not have any inputs or should not be provided the technical data, the scientific data necessary to investigate and explore and to bring into the forum of open public discussion and debate these issues that are going to drastically affect our lives is, I think to take a very nondemocratic attitude towards our whole society.

McCormack rebutted:

This program for intervenors started a number of years ago. It came before us in the Joint Committee on Atomic Energy when they came directly in and demanded support, financing so they could come in and oppose the programs the Federal Government was proposing. This was rejected. Now we are down to talking about forums and workshops and this sort of thing. But the key words in this are public interest groups. It is not professional science organizations. It is self-starting groups of private citizens who have a particular perspective that they want to impose upon the public and they want to use Federal bucks to do it.

Myers argued that there were insufficient checks on how the money was to be spent by NSF, and Rudd added:

It appears to be creating a giant and unnecessary un-think-tank which will not be productive. I oppose it.

Harkin observed that if the progress of the vast scientific and technological community "is going to be jeopardized by a paltry \$1.2 million, then that scientific and technological basis is on pretty shaky ground. I don't think that is the case." Harkin's amendment lost on a rollcall, 21-11.

In the subcommittee markup, a cut of about \$30 million had been made in funds for basic research. Dr. Frank Press, Director of the Office of Science and Technology Policy, telephoned Thornton and

persuaded him the cut was too deep. Accordingly, the subcommittee decided to use the excuse that the inflation rate was zooming upward much faster than calculated. The subcommittee therefore backed an amendment by Flowers in the full committee to restore half of the cut, and the Flowers amendment was adopted.

FLOWERS RENEWS FIGHT FOR WIDER DISTRIBUTION

In 1977, Flowers renewed the long effort he had been making to attempt to redress the balance in geographic concentration of research grants and contracts. Lightheartedly, Flowers told his colleagues:

This is the annual exercise in futility that I go through with NSF. For the benefit of some of the new Members, we have heretofore in years gone by been furnished with a geographical breakdown of NSF branches. It shows exactly in what parts of this great land of ours very nice grants and contracts are parceled out. Lo and behold, this year they did not even have the audacity to furnish us with the information. I have to conclude, friends and neighbors, that it is worse than it was before.* * * It will be easier to defend these grants if maybe one or two of them went to your district.

The solution which Flowers proposed was to make a slight change in the law passed in 1968, which read:

It shall be one of the objectives of the Foundation to strengthen research and education in the sciences, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.

Flowers suggested that in the first line the phrase "one of the objectives" be changed to "the objective." He explained:

Now they have generally been looking beyond that and saying generally oh, yes, that is one of the objectives but you know we have these other objectives, too, and that just has to take a back seat. I am merely trying to upgrade that and let them give a little bit better attention to it.

In a horrified tone, Ottinger protested:

Obviously, these ought to be given out first on the basis of merit. I think there ought to be an attempt to concentrate. You are not trying to force them to put geography ahead of all other considerations by this, are you?

Quickly and decisively, Flowers responded: "Absolutely not."

At Ottinger's suggestion, Flowers weakened his amendment by making it read "an objective" rather than "the objective" and it sailed through without opposition. The effect on NSF remained nebulous. About the only concrete result was that, working through Flowers, NSF did manage to pass along advice to Alabama educational institutions on how to sharpen up their proposals and applications for grants. Whether or not by coincidence, there appeared to be some increase in Alabama grants after Flowers had made his many protests. The whole exercise, however, did not result in any substantial changes toward a wider distribution of NSF funds nationwide.

On a rollcall vote of 21 to 12 in the full committee, Dornan's amendment was passed, requiring grantees in precollege education projects to obtain prior school board approval. The Dornan amendment followed the principle that a greater degree of grass-roots control over education was needed.

In 1977, the committee endorsed the policy decision that NSF basic research and comparable research throughout the Federal Government should increase at an annual rate of 9 percent. The rationale was that this would equal an annual gross national product growth rate of 3 percent, with the other 6 percent covering inflation.

FLOOR DEBATE ON NSF AUTHORIZATION IN 1977

During the floor debate on the 1977 bill on March 24, 1977, bipartisan support for the legislation was expressed both by Wydler (ranking minority member of the full committee) and Hollenbeck (ranking minority member of the subcommittee). Rudd, who had voted against the bill in full committee, also spoke and voted against the bill on the floor on the grounds that the increase over the 1976 funding was too large. Rudd's amendment, designed to concentrate more NSF funding to private industry, was defeated, largely through Thornton's opposition argument that 60 percent of all Federal R. & D. funds already went to the industrial sector, with less than one-fifth of that amount going to colleges and universities. Interestingly enough, Rudd, a strong conservative, supported a position which was written into the Senate bill by Kennedy, a strong liberal. The conference committee compromise retained the existing NSF ground rules, with the exception that the door was opened for cooperative industry-academic research projects and exchange programs.

Once again, the conference committee wrestled with the science-for-citizens issue, on which the House and Senate were far apart. Instead of the \$5 million authorized by the Senate or the \$100,000 voted by the House, the conference compromised on \$1.8 million—or 50 percent above the budget. But the House succeeded in writing severe limitations against use of the funds by either lobbyists or intervenors, and also banned those groups which the Internal Revenue Service defined as substantially engaged in propaganda or the influencing of legislation.

Another big battle with the Senate took place over one-year or two-year authorization, with the Senate claiming that the two-year period would allow more continuity and planning, and the House insisting that control and oversight were tighter if the customary procedure were followed. The House position of one-year authorization won out in 1977. But the logic of the two-year authorization plan was

compelling; it was also successfully argued that oversight might actually be more thorough if one year could be concentrated on authorization and the second strictly on oversight. In 1978, Congress finally agreed to test the two-year authorization concept for NSF in 1979 and 1980.

NSF AUTHORIZATION HEARINGS IN 1978

The subcommittee whipped through the NSF authorization in four lengthy days. For three of the four, Chairman Thornton turned the gavel over to Harkin, and Thornton himself chaired the windup hearing. Brown and Hollenbeck also played active roles in the questioning. Although the budget request for NSF reached a new high of \$940.9 million, Hollenbeck observed:

I, for one, am disappointed by the President's requested budget for basic research. Close examination reveals that it represents incrementalism camouflaged by inflation. * * * Why do we support basic research and science education? Perhaps partly to lay the foundations for increasing the stock of technical knowledge with which to insure continued prosperity in an era of limited resources; partly, to assist in the achievement of national security; and partly because, like art and music, they are cultural activities essential to man's identity without which we are little more than Diogenes' plucked chicken, the cynic's version of Plato's man.

Mr. Chairman, in Mr. Harkin's opening remarks last week, he observed that "basic research is an important cultural activity without which the spirit of man would be impoverished regardless of material consequences. It is unfortunate," he continued, "that last fact by itself is insufficient to win strong support for basic research."

I would concur with that, and further add that the material consequence of famished spirits will be impoverishment. It will require a great leap of imagination to see the possibilities beyond the problems of energy, population, and the environment.

Led by Harkin, several members during the hearings stressed once again that science education deserved a higher priority than a 4.9-percent increase. In its markup session, one of the first decisions the subcommittee made was to boost an allocation of \$77.6 million in this area to \$82 million—thus making the net increase 10.8 percent over the prior year. With Harkin presiding over the subcommittee markup on February 21, neither the staff nor any member threw down the gauntlet to challenge the nascent science-for-citizens program which had stirred so much opposition in the past.

On March 8, Harkin also presented the report to the full committee, asking for a modest \$400,000 increase over NSF's budget. In some areas, like deep-sea drilling, the committee recommended cuts and emphasized the need for balance between "little science" and "big science." Rudd once again offered a series of amendments with reductions in various programs, but the committee in all cases sustained the subcommittee.

FLOWERS MAKES LAST PLEA FOR GEOGRAPHIC DISTRIBUTION

For his swan song before retiring to run unsuccessfully for the U.S. Senate, Flowers made his last appeal for wider geographical distribution. To assurances from the staff that NSF was really concerned about the issue, Flowers plaintively observed:

I am wondering if it will be another false promise from the NSF or if it really offers any hope for us poor guys from the hinterlands. I notice the gentleman that I'm directing this question to is from the other hinterlands of our great Nation. This has been one of my pet frustrations, you might say, for about 7 years. I used to get real excited about it and get worked up. Maybe I'm getting older and not as mean as I used to be. I didn't go to the NSF hearings any more or badger the Director of the NSF.

Harkin responded that "we have talked to Dr. Atkinson at length about this personally. They know our concern." Trying to be helpful, Harkin added:

If they don't start moving in that direction, we are going to have to keep badgering them or do something to make sure they do move.

Flowers was not impressed, and small wonder, in light of his experience in the past. He boldly recommended:

I would suggest one sure way to get their attention would be to reduce their authorization by about 50 percent. Sometimes, when you are trying to lead an old mule, you put something loose around his head and you don't accomplish very much. But if you put a tight bit in his mouth, he understands you mean business. That is the way I feel about the NSF on this issue.

As usually happened in debates of this nature, the Congressmen from the "have" States threw up a smokescreen of both jocular and serious protests. Wydler reminded Harkin, who had just returned from a trip to Antarctica:

I notice the gentleman seems very concerned about the hinterlands, whatever that is. And you are increasing the spending that will be done in Antarctica—well, that is really out there. I don't know how you will get more into the hinterlands than Antarctica. * * * The great State of Alabama is doing pretty well with the Federal Government. I don't know what it is that they are complaining about. What is it that you are not getting that you want? You've got nearly everything now. What more can we give you?

When the staff pointed out that the most recent NSF figures showed California getting \$117,256,000, New York totaling \$77,600,000, Iowa \$4,893,000, and Alabama \$2,336,000, this moved Scheuer to say with all seriousness:

I think the peer review system is working. I think it is ferreting out talent wherever it is, and with all our problems in New York and Pittsburgh and Boston and San Francisco, we only had a few things going for us. One of these things is existing aggregation of scientific talent.

Scheuer observed loftily that he hoped the political process would not get involved with the National Science Foundation.

You could always tell when Flowers was about to make a funny. With only the suggestion of a slight twinkle in his eyes, Flowers turned toward Teague and pointedly remarked:

I think the sex habits of the African buffalo can be investigated even at Texas A. & M. College just as well as at M.I.T.

It is unfortunate from the standpoint of history that at this point the repartee went off the record and was forever lost.

In his dissenting views in the committee report in 1978, Rudd presented some startling figures on the problem. He showed that the latest NSF grants (fiscal year 1977) showed that the institutions in four States (California, Colorado, Massachusetts, and New York) received 42 percent of all funds awarded by NSF, while 9 other states (Alabama, Arkansas, Florida, Georgia, Louisiana, Mississippi, North Carolina, South Carolina, and Tennessee) received only 6.4 percent. The dollar figures for the four "have" States was \$685.1 million, against \$44.3 million for the "have nots." Rudd also pointed out that one institution alone—M.I.T. received \$20.9 million from NSF, far beyond the total of many entire States.

The lesson in all this is not that the bureaucracy ignores the Congress, although that is partially true. The conclusion can only be drawn that the Science Committee itself did not present a united front, and NSF like NASA knew that the Congressmen from the have States could be counted on to protect them from the thundering rhetoric of the have-not legislators. It is quite certain that Flowers' formula for "getting the mule's attention" would have worked, but it is equally certain he would have had great difficulty in getting such a proposition through Congress despite the fact that there was a big representation from the have-not States.

FLOOR DEBATE ON NSF AUTHORIZATION IN 1978

In presenting the bill on the House floor on April 18, 1978, Harkin pointed out that the committee-sponsored increase of \$4.4 million for science education exactly equaled what NSF had initially requested of OMB. Harkin labeled science education as "an area that the Science and Technology Committee has supported for years but which has been held down by the Office of Management and Budget." Although Rudd and Bauman spoke generally against the size of the NSF authorization, a challenge to the committee was made by Representative John B. Breaux (Democrat of Louisiana), who offered a floor amendment to restore the \$3.2 million which the committee had cut from the NSF's deep-ocean drilling project. Harkin and Hollenbeck success-

fully resisted the increase, on the grounds that it could lead to a half a billion dollar project which was not yet clearly defined. The Breaux amendment was defeated on a rollcall vote, 291 to 111.

ARE THOSE NSF GRANTS REALLY SO SILLY?

A much more serious challenge was made by Representative John M. Ashbrook (Republican of Ohio), who offered an amendment to cut the \$158 million for biological, behavioral and social sciences down to \$152 million. Ashbrook's amendment stirred an outburst of sympathetic support from Congressmen who had been receiving angry mail concerning the perennial problem of silly-sounding NSF research grants. Editorialists and commentators for years had been having a field day writing funny articles on how taxpayers' money was being wasted on "useless" projects. Ashbrook's amendment came on the heels of a segment of the widely-watched CBS "60 Minutes" show during which several questionable projects were ridiculed with the comment that many NSF grants are nothing more than "intellectual welfare." After citing a number of guffaw-producing titles, Ashbrook told the House:

Let us strike a blow for common sense by sending a message to NSF that it is time to stop awarding Federal research funds for "intellectual welfare."

Rudd echoed Ashbrook's plea, and added:

We cannot expect NSF to think seriously in terms of real public importance in the funding of research projects if we continue to authorize huge annual increases for esoteric and low-priority research.

In his rebuttal, Harkin led off with a quotation from a U.S. Senator named Simon Cameron who declared in 1861:

I am tired of all this thing called science. We have spent millions on that sort of thing for the last few years and it is time it should be stopped.

Harkin pointed out that Senator Cameron was referring to a \$6,000 appropriation for the Smithsonian Institution. Harkin went on to explain:

You know, we get a lot of talk in this Chamber about silly-sounding grants and about why they are funded. Let me give you an example of silly-sounding grants and what they do. Here is one titled "The Excretion of Urine in the Dog." How many Members would like to go on record as voting for funds to study the excretion of urine in the dog? Then there is "The Excretion of Insulin in the Dogfish."

Harkin told his listeners that these grants "led to vital information on the function of the human kidney and the relationship of hormones to kidney functions." He elaborated:

How many Members would like to vote to spend some of their taxpayers' dollars on a study that is titled "Concerning the Inheritance of Red Hair"? Do the Members

think their taxpayers would approve spending money on that? The answer is yes, if they are told the full truth about this study.

The study was done by Dr. James Neel of the University of Michigan Medical School, and he won the National Medal of Science for his work. That research increased our understanding of sickle cell anemia, a disease that follows genetic patterns of inheritance.

Representative John H. Rousselot (Republican of California) asked what "fruitful results" had come from a study of what makes "gay seagulls." McCormack answered:

Basic research is established as a search for truth, and many pieces of truth from many different sources may, over a long period of time, interlock together for the benefit of society. *** This particular study that he is questioning really has to do with the relationship between hormones in animal bodies and animal behavior. *** We have known for many years, for instance, that secretions—or the lack of them—in the body influence diabetes, our ability to metabolize sugar, that they influence gout, our ability to metabolize amino acids. We have learned that they influence schizophrenia and epilepsy.

Mr. Rousselot. Have we learned this from the gay gulls?

Mr. McCormack. We have learned this from basic research.

Mr. Rousselot. What basic research?

Mr. McCormack. Basic research similar to the research that is being carried out today in thousands of different experiments, such as the one the gentleman has picked to make fun of—

Mr. Ashbrook. The gentleman talked about schizophrenia. Maybe he is talking about balanced budgets and voting against amendments like this.

Mr. Teague. I confess I do not know anything about the sex life of seagulls, but I do know a little about cattle. A few years ago on this floor it was proposed that we study the sex life of the fly, and everybody laughed and everybody thought it was ridiculous. But anybody in this House who knows anything about cattle knows that we got rid of the screw worm by studying the sex life of the fly. So it is not good to ridicule every kind of proposal that comes up here.

THE RATIONALE FOR BASIC RESEARCH

It remained for an alumnus of the committee, Representative James G. Martin (Republican of North Carolina), a chemistry Ph. D., to help define the rationale for Federal funding of NSF basic research whose results could not be predicted:

Most scientific breakthroughs come not from practical applied studies but from fundamental research, where we do not know in advance whether or not we are going to find anything. *** It is in the field where we cannot tell whether there will be any monetary rewards where the public support is much more important; where it is much more important for public policy to provide a climate for that kind of research. That is where we must seek to enable our best minds to study, not what we as politicians think that they ought to be studying, but what they from their scientific training are led to be curious about, what they want to question, what they want to probe in a scientific way.

I would hope our Members would be very careful in considering this amendment before us today. * * * If we discourage our best talent from studying purely scientific questions which they can perceive but which you or I might ridicule, if instead we direct them to study only questions which the untrained mind can understand, society will lose.

Despite the eloquence of some of its opponents, the Ashbrook amendment struck a strong and sensitive chord among many House Members, who apparently felt that their constituents were more tax-conscious about simple arguments than understanding sophisticated logic. The Ashbrook amendment went down by 229-174, but in 1979 a similar amendment passed.

The differences with the Senate were resolved in an unusual way in 1978, without a formal meeting of the conference committee. Once the Senate passed its bill, Members and staff trekked back and forth between the House and Senate working out compromises on numerous dollar differences on programs. For example, a House-sponsored increase of \$2.4 million in the Antarctic program was compromised down to an increase of \$500,000; and a House-passed increase of \$4.4 million in science education wound up as a net increase of \$7.2 million over the budget. The final legislation, which was signed by the President on October 10, 1978, called for submission of a two-year budget in 1979.

THE SUBCOMMITTEE IN 1979

At the beginning of 1979, the following members were assigned to the subcommittee:

Democrats

George E. Brown, Jr., California, *Chairman*
James H. Scheuer, New York
Donald J. Pease, Ohio
Tom Harkin, Iowa
Allen E. Ertel, Pennsylvania
Kent Hance, Texas
Wes Watkins, Oklahoma

Republicans

Harold C. Hollenbeck, New Jersey
Robert W. Davis, Michigan
Donald Lawrence Ritter, Pennsylvania

The subcommittee jurisdiction was outlined as follows:

Legislation, general and special oversight and other matters relating to the National Science Foundation, the National Bureau of Standards, the Office of Science and Technology Policy and the Office of Technology Assessment; scientific research and development and applications; science policy; scientific resources (including manpower); science education; science information; technology transfer; technology assessment; industrial R. & D.; standards (weights, measures, etc.); patent policies as they relate to Federal research and development programs; R. & D. involving governmental health, biomedical, nutritional and handicapped pro-

grams; legislation and other matters relating to intergovernmental mechanisms for R. & D. and international cooperation in science and technology; oversight of high energy and nuclear physics programs of the Department of Energy; and all other non-military R. & D. not assigned to other subcommittees.

With abolition of the DISPAC subcommittee at the end of 1978, those functions were absorbed into the Science, Research and Technology Subcommittee. Brown surprised some of his colleagues by choosing the SRT chairmanship instead of one of the energy subcommittees (see chapter XX). Bill Wells moved in to become staff director of SRT, as Philip B. Yeager was named general counsel of the full committee. Dr. Thomas H. Moss became staff director, November 15, 1979.

THE NSF IN 1979

Instead of a two-year budget for the National Science Foundation, as recommended by Congress in 1978, once again the subcommittee felt that better oversight could be achieved by an annual budget review. For the first time in its history spanning a little over 25 years, the NSF budget exceeded \$1 billion. As he opened the hearings, Brown waved a copy of what he labeled his "highly significant" prepared remarks, which he said he would "mercifully abbreviate" and place into the record. He said that he intended to enlist each subcommittee member to play a substantial role in the shared work burden of the subcommittee. Although this is the announced objective of every committee and subcommittee chairman, only through the practice of genuine democracy, personal relationships, careful delegation, and inspirational leadership is it ever done effectively. Brown probably succeeded better than most chairmen because he was determined to practice all of these strategies. In his delivered remarks, Brown commented:

This occasion of change in membership is an appropriate time for reexamining our missions, our strategy or plans for achieving them, and the standards or criteria which guide our judgments and choices. It is an excellent opportunity to examine from a fresh viewpoint whether the National Science Foundation and the Federal Government are doing what is right for the American people. Perhaps we shall want to have a new look at some "old foundations" right here, in these hearings

Hollenbeck added:

At a time when many question the capacity for innovation in the Nation's political economy, it is heartening that our subcommittee, under your leadership, refutes conventional wisdom in your mandate for these hearings. I welcome, therefore, your call to consider a new look at old foundations for science and technology, and the National Science Foundation specifically.

Actually, there was insufficient time for the kind of indepth new look which Brown envisioned for the quick review in March 1979, with the budget deadline staring the subcommittee in the face. The

deeper probe had to wait for May 1979 when the subcommittee started its overall review of the NSF charter—the first such general review in a decade.

GROWTH IN RESEARCH FUNDING

When he presented the results of the subcommittee's deliberations to the full committee for markup on March 14, Brown noted that the subcommittee suggested a net increase of \$6.5 million in a grand total of \$1.006 billion. Increases were recommended in earthquake hazards reduction, appropriate technology, materials research, science education and scientific, technological and international affairs. Small reductions were made in basic research and several other areas. Wydler and Walker both challenged the assumption that the NSF budget had to be increased as fast every year, at a time of fiscal difficulties. Brown argued, as did the administration, that a good rule of thumb was to increase the expenditure about 2 to 3 percent beyond the inflation rate, to produce some real growth in research.

Flippo successfully offered an amendment to increase the NSF funding of handicapped programs from \$1.8 to \$2.8 million, and these additional funds were also directed toward research in problems of the mentally handicapped. Then Flippo recalled the many efforts made by his fellow-Alabaman, Flowers, to achieve better geographical distribution of NSF funds. Although the NSF act of 1968 admonished NSF "to avoid undue concentration of * * * research and education", neither the NSF nor the Congress, the committee report pointed out, had ever defined the word "undue". In response to proddings by individual Congressmen, the NSF established a very modest program (\$1 million divided among seven NSF-starved States "to develop improvement plans", possibly to help them get a better geographical break.) In 1979, with much fanfare, this program was "more than doubled" to \$2.7 million. In its report, the committee stated:

The committee reminds the Foundation of its obligation to avoid undue concentration of its funding.

The sop was thrown to the underfunded States to give each a very small pittance so they could theoretically pull themselves up by their bootstraps to achieve greater equality in the old game of grantsmanship. Nobody honestly expected any earth-shaking results from this noble gesture. The NSF called it their "experimental program to stimulate competitive research," but nobody held his breath to await dramatic results.

THE NEED FOR BASIC RESEARCH

At a time when most Members were measuring the economic cost benefit ratio of most Federal expenditures, Hollenbeck expressed to the House a somewhat different reason for supporting the NSF authorization:

I think we miss one of the central reasons for undertaking basic research if we focus solely on the economic benefits. Science is also a cultural activity like art and music—essential to our humanity. Science is not only important because it contributes to the solution of practical problems for the good of mankind, but also because it insists that we ask the question: What is mankind's good?

When a scientist uncovers a new fact about climate, about the atom, the gene, or about a blackhole, he implicitly questions our view of the world; he implicitly questions our individual and cultural identity. His research makes us question what it is we really want and what are our real needs. That is why we, as political leaders, are here today considering the authorization of the Science Foundation—because we have been elected to voice the aspirations of this generation of Americans.

Ritter encouraged the inclusion of language in the committee report to urge the evaluation of comparative risks of alternative technological solutions, as they related to national concerns such as energy, productivity, materials, environmental quality, food and drugs. These new concepts helped lay the basis for a successful symposium on risks and benefits which the committee staged in July 1979 in collaboration with the American Association for the Advancement of Science and the Senate Subcommittee on Science, Technology and Space.

CRAZY-SOUNDING GRANTS

The annual debate over silly sounding grants occurred when Ashbrook offered an amendment to cut \$14 million from the authorization for biological, behavioral, and social sciences. Ashbrook cited studies of finicky sheep, parakeet noises, and the social structure of the legal profession. He observed:

This amendment does not deal with basic, valuable research. It deals with the foolish, fringe folly of researchers who use our tax money like the dilettante squandering his inheritance—recklessly and with little meaning or value except to pander to their own snobbish tastes.

In vain, Brown, Harkin, Pease, Glickman, and Ritter detailed the many worthwhile advances which had been achieved through basic research grants which led to dramatic breakthroughs such as the work of Dr. Jonas Salk in developing polio vaccine. Pease explained:

A lot of times the researchers, not being used to dealing with the public, may leave themselves wide open to the kinds of criticism which a newspaperman or politician can easily use. As a newspaperman myself for 22 years, I know how easy it is, what a great, easy, attention-getting story it is, to pick up examples of supposedly wasteful expenditures on scientific research.



Among new 1979 members of the Science, Research and Technology Subcommittee were Representatives Donald J. Pease (Democrat of Ohio), left, and Donald Lawrence Ritter (Republican of Pennsylvania), right.

The publicity took its toll, however, and the Ashbrook amendment was adopted by a vote of 219 to 174. Committee members voting with Ashbrook were Anthony, Carney, Davis, Dornan, Flipppo, Glickman, Goldwater, Hance, Kramer, Lujan, Roth, Volkmer, Walgren, Walker, Watkins, White, and Winn.

The conference committee restored all but \$2 million of the Ashbrook cut, and the compromise cleared the House on July 13, 1979. Hollenbeck, an outspoken supporter of NSF, warned:

I would think that, considering some of the more outrageous jargon that social scientists use, it would be appropriate for the NSF to recommend or require a basic English course for many of its grantees.

DEPARTMENT OF EDUCATION AND NSF EDUCATION PROGRAMS

When the proposed Department of Education was under consideration in 1978, Fuqua as a member of the House Government Operations Committee sponsored an amendment in that committee deleting the proposed transfer of NSF education programs to the new department. The Fuqua amendment passed in 1978.

In 1979, the White House, through the Office of Science and Technology Policy, persuaded Fuqua that it would be desirable for

the new Department of Education to have a nucleus of high quality science education programs. Accordingly, Fuqua sponsored an amendment in the Brown subcommittee which cut the amount to be transferred in half "but still permitted the transfer of a small nucleus of programs those which I considered to be more on the fringes of science, such as minority and pre-college programs." Once again the Fuqua amendment passed.

The full committee report took a firm position against further transfer of NSF education programs to a new Department of Education, but did not feel that such language should be written into the NSF authorization act. Hence it was on March 27, 1979, that when Ashbrook offered a floor amendment to prohibit such a transfer, Fuqua, Brown and the committee decided to oppose the Ashbrook amendment. Ertel, who had filed dissenting views to the report language opposing a transfer, made an even stronger argument on the House floor against a move "to unnecessarily lock ourselves in at this point" before a specific proposal was made. Brown, with a slight tinge of sarcasm, remarked: "I am touched by the gentleman from Ohio (Mr. Ashbrook) wanting to protect the National Science Foundation." Wydler spoke for the Ashbrook amendment, but it failed by 218-175, with most committee members in opposition.

When the House debated the Department of Education bill on June 13, 1979, Harkin offered an amendment to block the transfer of the science education programs of NSF to the new Department. He noted that 9 percent of the NSF budget was devoted to science education, whereas less than one-half of 1 percent of the Department of Education budget would go for that purpose. He argued that the close relationship between scientific research and science education justified keeping these activities under the same roof. Hollenbeck, Pease, Ritter, McCormack, and Wydler all spoke for the Harkin amendment. Fuqua announced his opposition, stating that the transfer of just a few programs was a logical compromise. He explained:

The teaching of ethics and values, science information for citizens and public interest groups, precollege level science education, programs that were specifically designed for minorities and minority groups, these programs had certain social implications that could be logically transferred within the framework of the Department of Education. That was the reason this compromise was worked out.

Although over twice as many committee members supported the Harkin amendment, rather than Chairman Fuqua's position, the amendment was defeated by 240-165.

BASIC CHARTER OF THE NATIONAL SCIENCE FOUNDATION

On May 16 and 17, 1979, the Brown subcommittee launched on a year-long study of the National Science Foundation Act of 1950 and its numerous amendments. In announcing the hearings, Brown stated:

The review is intended to be reflective, thorough, and broad ranging. We will insure that appropriate individuals, organizations, communities, and stakeholders are adequately represented in a series of public hearings, and we shall be welcoming stimulating and creative thought on the Foundation's constitution and missions.

OFFICE OF TECHNOLOGY ASSESSMENT, 1970-79

On April 8, 1970, Congressman Daddario wrote a brief letter to Charles A. Lindbergh which opened with this paragraph:

You may recall some years ago our personal conversation in my office with regard to the developing relationship between science and technology. That was a most significant day in the life of our committee; indeed, it was a direct forerunner to the whole concept of Technology Assessment which has now taken root throughout the government, the country and, in fact, the world.

Lindbergh responded on April 15, stating in part:

Without doubt the very survival of our civilization, if not that of mankind, depends on our ability to foresee and control the fantastic forces of the various technologies our scientific knowledge has released. * * * This is why I am so greatly impressed by the efforts of your committee, and especially by your own understanding of the dangers as well as the assets of science and technology. On the one hand, technology is essential to us; on the other, it can easily destroy us.

When George Reedy, in *The Twilight of the Presidency*, commented that the Space Act of 1958 "was one of the few examples in the last 40 years of a major statute originating on Capitol Hill rather than in the White House," he was writing in 1970 prior to the passage of the legislation establishing the Office of Technology Assessment. The OTA bill was a clear example of a bill written at the initiative of Congress—and specifically at the initiative of the Daddario subcommittee—to create an institution exclusively for the assistance and use of Congress.

As noted earlier in this volume (see pages 159-161), the Daddario subcommittee held hearings on the issue in November and December of 1969 as a prelude to the 1970 introduction of the Daddario-Mosher bill to establish the Office of Technology Assessment. In addition to three major background studies which were completed in 1969, the National Academy of Public Administration furnished in 1970 a study of technology assessment in the executive branch.

Daddario moved with remarkable restraint and deliberation in 1970. After all, he knew it would be his last year in Congress. You couldn't blame him for wanting to get the technology assessment bill on the statute books as the capstone of his legislative career. But his subcommittee since 1963 had been characterized by very methodical, thorough, and extraordinarily detailed groundwork which moved slowly toward a consensus. The scientific community and many opinion-makers in various parts of the country were drawn into the act.

LOS ANGELES-SAN FRANCISCO HEARINGS

Hence in March of 1970, the Daddario Subcommittee had four days of public hearings in Los Angeles and San Francisco, exploring the relationship between technology assessment and certain environmental problems impacting on California—such as air and water pollution, aircraft noise, population growth, urban planning, and water resources management. In May, Symington on behalf of the subcommittee presided over two days of hearings in Webster Groves, Mo.

Bell presided over the hearings in Los Angeles, while Brown chaired the hearings in San Francisco. The California hearings were held because the State with its booming population and environmental problems, plus a reservoir of scientific and technological talent, represented in microcosm why technology assessment was needed and might have prevented some of California's emerging problems. The witnesses were drawn from a wide cross section of scientists, engineers, economists, environmentalists, and average citizens upset about aircraft noise and pollution.

Daddario blew his cool at one witness, Dr. John Rodman, a professor of political science at Pitzer College. Rodman attempted to depict why there were some "contemporary Luddites" who, like the machine-breakers during the early stages of the industrial revolution, were resisting some technological changes because they created more problems than they solved. Rodman deplored "the increasing pollution of the planet Earth that has proceeded hand in hand with industrialization, urbanization, and technological 'progress'," and the decisions by Congress that "only through further scientific research, through systems management, and through a more skilled management of the environment can our problems be solved." Daddario responded:

I would not like to have the assumption be made that this subcommittee is not interested in this problem. *** I think you put everybody into one of two categories, either do nothing or to just have technology run rampant, and one of the pervading feelings, I believe, of the committee is that we should not be mastered by our own technology. *** I find it really is somewhat disturbing that in your document you do come to the conclusion that we are for technology no matter what.

Rodman cited the 1968 subcommittee report on "managing the environment" to make his point that the conscious technological choices used by decisionmakers were really not improving the environment. Acting Chairman Brown evened things by observing:

Dr. Rodman, this is one of the few times that I have seen our distinguished chairman of the subcommittee take umbrage with a witness, and, frankly, I didn't get the same reaction at all.

But as Daddario pointed out in a letter to President Nixon early in 1970, the subcommittee's 1968 report did lead toward the National Environmental Policy Act of 1969, the legislation requiring environmental impact statements prior to governmental action in any field.

SYMINGTON AND THE MISSOURI HEARINGS

In the hearings in Webster Groves, Mo., Symington dazzled his listeners with a series of apt quotations from Emerson, Tennyson, and René Dubos, and delighted the hearing with William Wordsworth's plaint against the industrial revolution:

Enough of science and of art
Close up these barren leaves
Come forth and bring with you a heart
That watches and receives.

Symington attempted to place the problem Rodman raised in perspective by observing:

We realize that technology per se is not at fault. It is neutral; it merely answers the question we put to it.

In an address to the House in April, Daddario put it this way:

Technology is simply the ability to apply knowledge. Its worth depends on how men handle it.

He described the 5-year effort, culminating in the Daddario-Mosher bill to set up OTA, which he labeled "among the most important long-range pieces of legislation to be introduced in modern times." He added:

And, at this point, Mr. Speaker, let me pay special tribute to the gentleman from Ohio (Mr. Mosher), whose perception and constancy have been indispensable to the progress which had been made in this field.

In May and June 1970, the Daddario subcommittee had six days of hearings on the Daddario-Mosher bill to establish the OTA. The subcommittee stressed that by 1970 the long weeks of discussing "concept and philosophy" were over, and the time had arrived to grapple with the specifics of legislation. Daddario in his opening statement also reflected the philosophy of the early 1970's—that the highest goal was the quality of life as reflected in the environment, and the purpose

of technology assessment was "to preserve and improve the social and physical environment." He added:

Our hope for correcting earlier mistakes which have resulted in, among other things, the polluted air and water which surround us, lies at least in part in the further exploitation of science and technology. We must assure ourselves that the medicine is not worse than the disease!

A RIDER TO THE LEGISLATIVE REORGANIZATION ACT

By July, the subcommittee had perfected an 18-page bill. Now all the clearances had been made. The careful groundwork had been completed. Suddenly, the mood in the subcommittee became optimistic. Even though it was fairly late in the session, why not canvass the possibilities for getting the bill considered by the 91st Congress? A likely vehicle suddenly appeared: The Legislative Reorganization Act, which grew out of an earlier report of the Monroney-Madden joint committee and was scheduled for House action in the summer of 1970. Daddario and his staff concocted plans to try and attach the OTA bill as an amendment to the legislative reorganization proposal. Extensive discussions were held with the House Parliamentarian and with members of the Committee on Rules, which was handling the reorganization issue on the floor.

On July 13, Daddario and Mosher sent out a very detailed "Dear Colleague" letter, leading off with this sentence:

We ask your support for an amendment which will be offered this week to the proposed Legislative Reorganization Act, the purpose of the amendment being to provide the Congress with a genuine early warning system for the assessment of developing technology.

The House consideration of the reorganization bill was delayed several times, giving Chairman Miller the chance to get full committee approval of the OTA bill on August 6.

PENETRATING QUESTIONS BY WYDLER

Although the full committee eventually cleared the bill unanimously, there were some skeptical questions from Wydler, who later was named a member of the Technology Assessment Board. Davis handled the bill in Daddario's absence. When Davis had finished his explanation of the bill, he had a few choice exchanges with Wydler:

MR. WYDLER. I am sorry, Mr. Davis. We are going to set up a group of men and they will do exactly what? For instance, you state here they could have a great value to us and the country in things such as the TFX controversy, the anti-ballistic missile problems, chemical and biological warfare. What could this group do with these types of problems?

MR. DAVIS. Each of these controversies—the TFX, ABM, chemical and biological warfare—has a tremendous scientific and engineering component. There can be no

question about that. Well, the membership of Congress, and the public, is largely comprised of laymen. There are very few technically expert men in Congress. In fact, I don't know that I can name any. Certainly there are not any who would be expert in all three of these fields that you have just named.

The function of a technology assessment board would be to see that proper attention was brought to bear on these problems so that when they report it back Congress might be in a position to act with intelligence. * * *

To have an anti-ballistic missile you must figure out a way to intercept and destroy it while it is on its way to a target. That involves extremely high velocities. There is a raging scientific controversy as to whether or not it can be done practically. It is a matter that soon finds itself totally beyond the expertise of any Member of Congress. This organization would be able to explore such questions as that and to render some order out of the chaos.

Mr. WYDLER. That is what I do not understand. How would that happen?

Mr. DAVIS. We would be consulting with a private group, a university, or any other knowledgeable source. They would have the duty of coming up with a resume of accurate information on the problem. We certainly do not have anything such as that now.

Mr. WYDLER. Why would we need the advice of this board we are talking about, this new group of men to sign a contract to tell us what particular scientists thought about whether or not the ABM would work? I am having a hard time following what they will add to what we are doing in the government already. I suppose that is my question, really. I am sure this has been done over and over again.

For instance, on practically all the matters you refer to, such as the supersonic transport, we have had so many reports from so many groups of various aspects of the supersonic transport—do I understand that if we set up this Board we will not have anybody else doing these things? Will this Board be doing it along with the other groups? What will this Board add?

Mr. DAVIS. In DOD, you are constantly bumping into the question of classified information for one thing. Secondly, if you consult industry—or consult any other specialized segment of our society you will run into various answers. * * * It also has the further virtue of being more than simply a legislative reference service, which is all we have now in the way of our own independent investigative agency. It would be able to find the area where not enough information is now known and develop the information.

The long-drawn-out debate and consideration of the Legislative Reorganization Act had made it uncertain when the time would come for Daddario to try his big amendment. After several false starts, the opportunity finally arrived on September 16. Gross immediately grouched that the amendment was 20 pages long, and that "my hope is that this whole thing will be beaten." Representative B. F. Sisk (Democrat of California), a former member of both the select committee and the Science Committee, raised a point of order against the amendment on the grounds that it went beyond existing congressional institutions and set up an entirely new agency which involved some appointments by the President. The point of order was sustained.

However, the fact that the committee tried in 1970 made it easier in the next Congress to get the approval of the Committee on Rules and go through regular legislative channels to get support for the OTA bill. Also, other Members were not caught by surprise by the new and unusual nature of the concept, which had already been widely discussed in the newspapers, trade journals and throughout the scientific community. By now, "early warning" on technology had been part of the Nation's vocabulary for five years, the legislation had been introduced and discussed in the Senate, and letters were starting to come in from around the country to urge many Congressmen that this was an idea whose time had come.

UNANIMOUS COMMITTEE SUPPORT FOR OTA BILL

When the new chairman of the Subcommittee on Science, Research and Development, Congressman Davis, asked the full committee members in January 1971, who wanted to sponsor an identical version of the 1970 OTA bill, he received a surprising response: all 28 members wanted to get on board. Davis dropped the bill into the hopper on February 2 and it looked as though OTA was off to the races at last. To speed things up further, Chairman Miller decided that since full hearings had been held late in 1969 and in 1970, including the field hearings in California and Missouri, the committee would just go ahead and crank the bill through the legislative process without time-consuming and duplicative hearings. After all, such hearings would only serve the purpose of orienting new Members and going through the motions; the former could be handled by the subcommittee and the latter wasn't worth the effort.

Several developments early in 1971 converged to delay consideration of the OTA bill. Daddario, the driving force behind the years of preliminary work on the bill, was gone from Congress. For a considerable part of the spring, Davis, his successor, was ill and it was difficult to make firm decisions. Miller did not want to push in the absence of Davis. In February and March, the NASA and NSF authorization bills occupied the full attention of the committee. The new emphasis which OMB had directed NSF to throw into the research applied to national needs (RANN) program and other unexamined issues forced the NSF hearings to spill over into April. Not until the NSF bill had been passed by the House in early June could the committee shake loose to concentrate on the OTA bill.

Finally on June 10, the subcommittee met and unanimously reported the bill. It was agreed to submit several minor amendments when the full committee met. Chairman Miller called an executive session of the full committee for July 22, and the bill was warmly

supported. Bell sponsored several amendments designed to tighten congressional control over the activities of the Technology Assessment Board by insuring that there were more congressional than executive appointees. He also got through an amendment which strengthened the role of the minority in this way: in addition to authorizing the OTA to undertake activities at the request of a congressional committee chairman, the Bell amendment broadened this to include a "request of the ranking minority member of a majority of the committee members." Pelly sneaked in an amendment limiting OTA authorization to one year. The amendments all went through, and Davis with a host of cosponsors introduced a clean bill on July 30.

HURRY, HURRY!

The clock was ticking on the 1st session of the 92d Congress by the time the full committee got around to reporting out the bill. Rules Committee Chairman William Colmer (Democrat of Mississippi) issued his annual edict that his committee would hear no bills except emergency measures after September 1. So the staff burned the midnight oil to get a report written on the legislation, which Chairman Miller had obtained permission to file despite the fact the House was on its summer recess.

Congress was in turmoil late in 1971. President Nixon had imposed a price-and-wage freeze, legislation was piling up, constituents had given their Congressmen an earful of economic troubles during the recess, and the jockeying was under way for the 1972 Presidential campaign. Miller, Davis, and Mosher, accompanied by subcommittee staff director Yeager had a round of conferences with Speaker Albert, Majority Leader Boggs, Rules Committee Chairman Colmer, Representatives Richard Bolling (Democrat of Missouri), and John B. Anderson (Republican of Illinois), as well as with Sisk who had helped kill the 1970 attempt with his point of order. The consensus among those advising the Science Committee was that the Rules Committee would grant a hearing and probably vote a rule if the Science Committee insisted. But Miller, Davis, and Mosher were advised that the chances for passage of a bill to set up a new agency were not very optimistic given the testy mood of the Congress in the fall of 1971.

Rules Committee Chairman Colmer persuaded Miller that he would give the OTA bill a hearing after Congress got back from its Christmas holiday early in 1972. Meanwhile Davis kept the issue alive and helped educate all Members on the need for the bill through a series of Congressional Record statements in November and December of 1971. In these statements, Davis outlined several recent developments in the use of technology assessment by private industry,

in various States, and by international organizations. He also got more specific on how OTA might help Congress supply more scientific information on the technological impact of such developments as the SST, the Alaska pipeline, supertankers, the spread of mobile homes, cable television, and the use of computers.

INTEREST IN TECHNOLOGY ASSESSMENT MOUNTS

Citizen interest continued to be expressed in letters like this one to the committee from a lady in Pittsburgh:

I am not young, and am not technically trained, so will very likely never see or suffer greatly from misuse of the things that can, and I believe, will happen with irresponsible and uncontrolled development of various and spectacular advances in many fields.

I can imagine nothing worse than an unchanging world, but I think we need to be aware of long-term as well as immediate consequences and plan accordingly. Even the most responsible specialists get carried away by their accomplishments and see only their own small part of society, so somehow we ought to insure a system of overall knowledge and reasonable control.

A Federal Board might perform this function, so I will be very much interested and appreciate it if you can tell me more about the (technology assessment) idea.

By now, the issue was being widely debated, covered in feature articles, the subject of conferences and forums of learned and unlearned societies. Prof. Raymond A. Bauer of the Massachusetts Institute of Technology, in an essay on the subject, certainly clarified one aspect when he wrote:

How does one carry out technology assessment? I suppose that at this stage the problem is akin to that of how one can eat an elephant. And, considering the magnitude of the task, it is difficult to argue that one place is better than another for the biting to begin.

SURPRISE

After meeting almost until Christmas in 1971, the 92d Congress decided to postpone the start of its 2d session until January 20, 1972. Having been put off so many times before, Science Committee members took with a grain of salt the promise of the Rules Committee that a hearing on the OTA bill would be held early in the second session. Therefore, it came as a real surprise when Chairman Miller received a telephone call only a week after the new session had convened, informing him that the magic moment had arrived. Miller received the call with mixed emotions. His pride and joy, the Panel on Science and Technology, was meeting January 25-27, tying up the committee members in the high level discussions and conflicting with the Rules Committee meeting. Miller had the meeting postponed and it was finally reset for February 1, 1972.

Top committee members held a strategy session before the Rules Committee appearance. First, they decided to work up a comprehensive set of material, but to allow Davis to present the case in a low key, off-the-cuff fashion. Second, Miller, Davis, Mosher, Cabell, Symington, and Bell served as missionaries to explain the bill to various Democratic and Republican members of the Rules Committee. Armed with two brief fact sheets—one a summary of "basic facts" and the other a series of questions and answers, Davis made his short presentation. Davis emphasized the need for Congress to receive independent and unbiased information on technology assessments, and also how the OTA might avoid wasting money on poorly conceived technological projects. The formal hearing lasted only 10 minutes, and the strategy really paid off. The questions from the Rules Committee members were all sympathetic, and a rule providing one hour of debate was granted the same day as the hearing. The House leadership quickly scheduled floor action on the bill for February 8, exactly a week after the Rules Committee hearing.

Mosher was designated as the Republican floor leader for the OTA debate in the House.

PREPARING FOR THE FLOOR DEBATE

Intensive preparation for the floor debate occupied the committee and staff in the week prior to February 8. Prepared statements were assembled on all facets of the technology assessment movement. Democratic and Republican committee members were briefed, and a division of labor was carefully arranged and assigned. All was not smooth sailing, and several "flaps" occurred. The Democratic Study Group, a powerful organization with a liberal outlook which included most of the House Democrats, was enlisted to help organize the floor effort. The DSG chairman, Representative Don Fraser (Democrat of Minnesota) joined Symington in trying to broaden the bill to enable subcommittee chairmen and ranking minority members to initiate assessments. Davis and Mosher as the Democratic and Republican floor managers for the debate, vetoed this suggestion, and it was not pressed further.

It is an unusual day when everything goes according to plan in the Congress. Who could have predicted, for example, that the House would be taking up, fiercely debating and finally defeating a resolution to establish a Select Committee on Privacy just before the OTA bill? The privacy debate escalated into a vague attack on computerization, technology and modern society—scarcely a good backdrop for a reasoned discussion of OTA. Davis had one minor problem to face: he

knew he would have to offer an amendment on the floor to extend the OTA authorization for two years, overriding Pelly's committee effort to limit OTA to a one-year authorization. Davis knew this was necessary because there was such a short time left until the fiscal year ended on June 30. His preference was not to have a two-year deadline and extend OTA indefinitely, but he realized this was expecting a little too much of those who had backed the Pelly amendment in the full committee. His judgment proved sound, as the two-year authorization subsequently went through.

If there is anything that disturbs the floor manager of a bill the most, it is the receipt of last-minute amendments with far-reaching implications. When you receive such surprise amendments far enough in advance, it is possible to organize against them and complete the necessary research for floor arguments or to reshape the amendments so that they are acceptable. If the amendment is offered immediately prior to its being taken up on the floor, you can always count on a group of Congressmen who will be attracted by the argument that it is unfair to spring something at the last minute without everybody concerned getting copies. But the best strategy for those who really want to see their amendments adopted is to hand them to the floor manager on the same day the bill is debated, allowing enough time so it can't be charged it is unfair, but not enough time to organize counter-arguments and strategy.

Speaking in support of the bill were Davis, Mosher, Winn, Symington, Wylder, McCormack, Cabell, Miller, Teague, Esch, Pelly, Fuqua, Hanna, Seiberling, and Bell of the committee, as well as Illinois Republican Representatives Robert McClory and John B. Anderson.

THE HENDERSON AND BROOKS AMENDMENTS

As Davis went to the floor for the February 8 debate, he was handed several amendments by Representatives David B. Henderson (Democrat of North Carolina) and Jack Brooks (Democrat of Texas). Henderson proposed to eliminate the authority of the OTA Director to fix the pay rates of certain professional personnel without regard to Civil Service requirements. After some consultation, Davis decided to accept the Henderson amendment. The Brooks amendments were more serious and fundamental in character. They radically altered the composition of the Technology Assessment Board from a mixture of congressional and Presidential members to an all-Congress board. Also, they eliminated OTA's subpoena power and the Director's authority to initiate assessments. Davis and his allies decided to fight the Brooks amendments.

In the general debate, Davis offered this definition:

Technology assessment is a mechanism which may be used to evaluate the impacts, good and bad, which new or developing technology may be expected to have on legislative programs with which the Congress may deal; the intent is not to evaluate the technology itself, but to evaluate the impacts—physical, economic, social and political. Most importantly, it is designed not only to provide Congress with early warnings of possible troubles—but to help move new technologies into action rapidly in areas of society where they can be helpful.

Mosher, the Republican floor leader for the debate, elaborated:

Too often, we in the Congress are flying blind—or at least much more in the dark than is necessary or good—to the extent that we do not obtain better information and advice than we now have so as to be more sure of what we actually are doing when we make decisions which involve the use of new technology. * * *

Let us face it, Mr. Chairman, we in the Congress are constantly outmanned and outgunned by the expertise of the executive agencies. We desperately need a stronger source of professional advice and information, more immediately and entirely responsible to us and responsive to the demands of our own committees, in order to more nearly match those resources in the executive agencies.

The Brooks amendments attracted a great deal of attention and support on the floor. Instead of an 11-member Technology Assessment Board, including 4 House and Senate Members, the Comptroller General, Director of the Congressional Research Service, 4 public appointees of the President and the Board Director, Brooks proposed a 10-member Board with 5 House and 5 Senate Members. He stated that through use of his appointive power, the President could control the Board under the committee proposal. Davis argued:

I do not think that there are many Members of Congress who could afford the time that ought to be given as a member of the Board. * * * If we were placing some of our power in somebody else's hands, that would be a horse of a different color. But we are not doing it, and I think in this instance my friend from Texas (Mr. Brooks) has found that he is on a witch hunt. He has found a danger that just does not exist.

OTA BILL PASSES WITH BROOKS AMENDMENTS

Only a small minority of the total membership was on the House floor, following the hour-long general debate and another hour occupied with amendments. The Science Committee managers of the bill decided not to drag out further discussion of the Brooks amendments, but to bring both the amendments and the bill to a quick vote. On a division vote, the Brooks amendments were adopted, 29-19, and then the bill passed by a comfortable roll call margin of 256-118.

The sponsors of the OTA bill paid close attention to development of the bill in the Senate, where a bipartisan group of Senators led by Kennedy, B. Everett Jordan (Democrat of North Carolina), and Gordon Allott (Republican of Colorado) were carrying the ball. In an unusual burst of activity on Senate legislation, four Science Committee mem-

bers Miller, Mosher, Davis, and Symington — went across the Capitol to testify before the Senate Rules Committee on the bill. They conceded the Board could be reconstituted as an all-Congress Board, but they disagreed with Brooks that it should be always ruled by the majority party, with the Director acting in the subordinate role of the staff director of a joint committee. The House members also argued that liaison with the public could best be established through an advisory council appointed by the Board, which was done. Soon a substitute bill backed by Brooks surfaced; it did away with the Board and placed the mechanism under the Joint Committee on Congressional Operations, of which Brooks was chairman. Senator Lee Metcalf (Democrat of Montana), vice chairman of the joint committee, fought for the Brooks version in the Senate. Senator Kennedy was able to stave it off.

PRESIDENT SIGNS OTA ACT

Just when full concentration was needed desperately, political problems suddenly took center stage. Senator Jordan and Chairman Miller both lost their party primaries. The national conventions occupied the attention of most Members through the summer. The Senate finally passed the bill on September 14. Miller, Davis, Cabell, Mosher, and Esch served on the conference committee, which came to an early agreement. The House then endorsed the final version of the OTA bill without a roll call on October 4 and the President signed it into law on October 13.

The final version restored equality between Republicans and Democrats by authorizing six House and six Senate Members on the Technology Assessment Board, to be appointed by the Speaker of the House of Representatives and President Pro Tempore of the Senate. The chairmanship and vice-chairmanship rotated between House and Senate every two years. Much of the Director's power was restored, which was important in light of the fact that everybody's choice for the first Director was former Congressman Daddario.

It is interesting to note that somewhere along the legislative trail that familiar battle cry "early warning" fell by the wayside. Ever since Daddario and his allies had been talking about the need for technology assessment—going back to 1966—the graphic phrase "early warning" had been used. It was a striking analogy to equate technology with the flight of an intercontinental ballistic missile, and the warning system set up for alert purposes. But it was the kind of term which raised doubts in the minds of some in private industry. There were sardonic references to "technology arrestment" on the part of those who feared that the whole exercise was designed to be negative in

nature, somehow allied with those environmentalists who wanted to return to Thoreau's Walden Pond. "Early warning" remained in the House bill, and the timing of its demise can be related to a draft which had been submitted by Congressman Jack Brooks which changed the phrase to "early indications." Yeager, who was in on the drafting process, was eager to retain as much as palatable in the Brooks draft. He was also aware of the apprehensions of those in industry who perhaps felt that "early warning" might convey to the public that Congress felt that all technology, like the ICBM, was destructive. So the "early warning" phrase was given a quiet burial. Instead, the OTA was charged with providing "early indications" of technological impacts. That sounded a little more positive.

The creation of the new Office was the first independent service organization for Congress since the establishment of the General Accounting Office in 1921, and only the third in history—the first being the Library of Congress established in 1800.



Early officials of the Office of Technology Assessment: From left, Former Representative Emilio Q. Daddario (Democrat of Connecticut, Director); Representative Charles A. Mosher (Republican of Ohio, Vice Chairman); and Senator Edward M. Kennedy (Democrat of Massachusetts, Chairman).

GROWING PAINS AND PERSONALITY PROBLEMS

Among the Science Committee members who served on the OTA Board were Teague (Chairman, 1975-76), Mosher (Vice Chairman, 1973-74), Winn (Vice Chairman, 1977-78), Davis, Esch, Brown and Wydler.

The first appointments to the Board were made late in 1972, but the Board did not hold its first meeting until April 10, 1973. Congress did not make funds available for OTA until November 1973. Daddario finally took office as the first Director late in 1973. From the start, OTA was beset with serious growing pains and personality problems. For example, the first Chairman, Senator Kennedy, was accused in a March 27, 1973, Wall Street Journal article of planning to use OTA for his personal political purposes. The article alleged that from the perspective of President Nixon's White House "OTA bears a peculiar resemblance to a shadow government with Teddy Kennedy for President." Mosher commented that he felt the article was on the sensational side and responded "I'm convinced that he is determined that OTA not be a partisan operation." In a 1979 interview, Mosher later suggested that derogatory allegations concerning Senator Kennedy's role in the OTA "had been carefully manufactured and planted as part of the 'dirty tricks operation' of the Nixon White House." But the undertone of criticism persisted. Several House Members, including Teague, frequently grumbled that Kennedy had more of his personal staff, and more OTA staff, working for his own interests than other Board members. Later, a Nixon White House alumnus, William Safire, wrote a biting criticism in a New York Times column, referring to Senator Kennedy and the "Charles River gang."

These developments and others within OTA are not the central focus of this history. Yet the operation of OTA did serve to occupy a large amount of the time and effort of the Science Subcommittee, plus Board members like Teague. Problems like getting sufficient funds for OTA, trying to iron out the relations between the Board and the Advisory Council, helping to staff OTA, keeping the scientific community informed and reasonably happy, answering news media inquiries, firming up relationships with congressional committee chairmen and staff, encouraging proper OTA relationships with the Congressional Budget Office as well as the Congressional Research Service and General Accounting Office—these were but a few of the problems made more difficult because of the nature of the beast: OTA was the brainchild of the subcommittee, which had a strong stake in its success. At the same time, the subcommittee like a good parent was committed to the principle of weaning the infant at an early age so OTA could develop the strength and independence to stand on its own feet.

Daddario as the father of OTA and its first Director had his own ideas as to what it would take to make OTA succeed.

Unlike NASA or the NSF, OTA had no vast executive branch to nurture it. The all-Congress Board included strong-minded individuals with their own constituencies, used to asserting their own prerogatives. The Advisory Council was composed of knowledgeable, independent, and influential leaders in their own right, who believed in speaking out strongly and not having their advice ignored. The relationship among the Board, Council, and OTA staff was described by Mosher as "a very uneasy troika arrangement which has produced unfortunate difficulties and frustrations for all concerned."

OTHER OTA PROBLEMS INVOLVE THE SUBCOMMITTEE

And as if these factors did not produce enough problems, the House Commission on Information and Facilities, the Commission on Operation of the Senate, and later the House Commission on Administrative Review conducted investigations of OTA which were not altogether friendly in character. OTA staff spent a lot of their time preparing for these investigations and agonizing over their results.

Dr. Harold Brown, president of California Institute of Technology, first Chairman of OTA's Advisory Council (and later President Carter's Secretary of Defense), resigned in December 1975 as Advisory Council Chairman with a publicly critical letter. Dr. Brown protested that the Board wasn't listening to the advice of the Advisory Council on many issues. One observer compared this to "unhappy prep schoolers banging their spoons on the cafeteria table."

In June of 1976, the Board decided to hold some hearings "to identify technology assessment and related activities." This decision angered Symington, who was then chairman of the Subcommittee on Science, Research and Technology. He wrote a blistering letter to OTA Director Daddario:

I was not apprised that these hearings were being held until given this information the morning hearings got underway by members of our own committee staff and my office staff. I am not sending this note in order to lodge any formal complaint, nor am I doing so in a spirit of pique. But I believe that when the Board undertakes hearings which, under the rules of the House or Senate, encompass areas which are specifically within the jurisdiction of certain standing committees of either House, it would be helpful to notify the chairmen of the appropriate committees or subcommittees. I am sure you will agree that there may be times when this procedure could avoid considerable misunderstanding or ill feeling.

It was not the kind of letter which good friends send, but Daddario was informed that it was being sent and he was not too unhappy with its tone or substance. The letter was intended as a sharp warning by the subcommittee to the Board that it should stop acting like a joint

committee of Congress by holding hearings, and act more as a policymaker for OTA. Whether or not by coincidence, the Board ceased holding hearings of that character in the future.

THE TEAGUE REPORT

As Teague neared the end of his term as Chairman of the Technology Assessment Board, he made a report in December 1976 which reflected on the past and future of OTA. He also indicated that after he left the Board chairmanship, he intended for the Science Committee in 1977 to hold comprehensive hearings on OTA and its components. In his 1976 final report, Teague pointedly remarked that when the basic legislation had been considered in 1972, the Science Committee "never recommended or intended" an all-congressional Board. Public members on the Board would have obviated the necessity for a separate Advisory Council. Teague added in his candid report:

There is little doubt that a number of the difficulties which have confronted OTA thus far—certain managerial problems as well as the Board's disposition to think and act on occasion as a joint committee rather than a board of directors—can be directly traced to deviations from the original plan. Of course, the original plan would have produced its own set of hurdles—whether more or less we do not know. Most impartial students of OTA seem to think the original concept offered less chance for polarization, whether on the basis of political party or the basis of Senate vs. House, as well as less political motivation in personnel and appointments and in the choice and evaluation of assessments. Obviously, this is speculation.

Daddario resigned as OTA Director in May 1977. Even before the new Director, former Governor Russell W. Peterson of Delaware, was appointed in January 1978, the subcommittee opened hearings in August of 1977. Thornton, the new subcommittee chairman, stated on August 3:

Our purpose in these hearings is to review OTA's Organic Act and determine if it needs alteration based on OTA's experience thus far. To do this we need to inquire into the concept of technology assessment as used in the work of Congress and how the office established to assist the committees of the Congress in this field is discharging the duties assigned to it.

After the August congressional recess, Chairman Thornton scheduled seven days of hearings in September and October 1977. In announcing these hearings, Thornton commented:

Since OTA was established by Congress in 1972, the Office had conducted over 40 major technology assessments for the committees of the House and Senate. Most recently the OTA has provided an in-depth review of all aspects of the President's energy proposals, has completed assessments of cancer testing technology, off-shore oil recovery, the effects of limited nuclear war, the future availability of imported materials, utility of auto crash recorders, and agricultural research, among others.

CONCLUSIONS ON OTA

The Thornton hearings continued during March and April of 1978. In a comprehensive, 211-page report released in November 1978, the subcommittee furnished a wide-ranging analysis of OTA and its problems and challenges, summarizing a massive amount of testimony, and presenting a number of conclusions. Chairman Thornton wrapped it up this way:

I think the Subcommittee's inquiry points to these basic conclusions: (1) OTA is being used by the various committees of the House and Senate and there appears to be a growing reliance upon it by the Congress; (2) the assessments which have been performed thus far by OTA have proved useful to the Congress in a large majority of the cases; (3) OTA should continue to be supported by Congress as a unique source of important evaluated information; and (4) while it seems clear that the 1972 Organic Act would profit from certain legislative changes, OTA should continue its operations on the current legislative basis for at least two more years, at which time amendments to the statute might well be considered.

Chemical and Engineering News commented:

In sum, the committee gives the agency an affectionate pat on the rump. It says, in effect, "You're making it, boy. Stick in there."

The storm clouds over OTA darkened in 1979. Former Governor Peterson resigned as OTA's Director after serving only 13 months of his six-year term. He was succeeded on June 1, 1979, by Dr. John H. Gibbons of Oak Ridge National Laboratory. When Fuqua appeared before the House Administration Committee's Subcommittee on Accounts on March 13, 1979, Representative John Brademas (Democrat of Indiana), the subcommittee chairman, questioned OTA's track record and urged stricter oversight by the Science Committee. In a letter to Brademas on March 20, 1979, Fuqua expressed agreement "that continued surveillance of OTA operations by the Science and Technology Committee is needed." Fuqua added:

We may well give consideration to legislative reform of the Office, since OTA's problems appear more related to procedures, protocol and structure than to production. The latter, as I mentioned, has been generally meritorious.

General Counsel Yeager then proceeded to draft legislation to amend the Technology Assessment Act of 1972 in an attempt to alleviate the problems.

FIRE RESEARCH AND DEVELOPMENT

When Congressman Davis presented the Fire Prevention and Control Act of 1974, one of the greatest needlers in the House, Congressman Gross, asked:

I wonder how in the world this bill ever got to the Committee on Science and Astronautics. There are no astronautics involved that I know anything about unless it is proposed to put firemen in the air someplace.

Davis explained that the committee had jurisdiction over the National Bureau of Standards, which originally administered fire research.

As a matter of fact, in 1970 Chairman Miller set up a Special Subcommittee on the National Bureau of Standards, giving the chairmanship to Davis at a time when Daddario was still serving as chairman of the Science Subcommittee. One of the major products of the special Davis subcommittee was a report on "A Program for the Fire Research and Safety Act" which was published after a one-day hearing by the subcommittee on April 22, 1970. Dr. Lewis M. Branscomb, Director of the National Bureau of Standards, told the Davis subcommittee how his Bureau had become involved in the issue in the first place. It seems that back in 1904, when 70 blocks of downtown Baltimore were gutted by fire, equipment from miles around—even as far as New York City—came to help, only to find that their hoses could not be connected to the Baltimore hydrants because there were no accepted standards for the diameter and screw thread of the couplings. Standards of interchangeability were then put into effect.

The Fire Research and Safety Act, which was developed by the Science Committee in 1968, added new responsibilities to the Bureau of Standards for fire research. But the 1968 act at first was funded at the ridiculously low level of \$300,000 a year. In addition, the 1970 bill contemplated not only further investigation of the causes and prevention of fires, but also public information on fire hazards, education and training programs for professional firefighters, and demonstration programs. The full committee cleared the bill for further action July 9, 1970, but the Rules Committee turned a deaf ear toward requests for a hearing. Chairman Miller confessed to the full committee:

We are a little slow because we are slow in getting hold of some of these things. We are coming in now where we should have done this maybe two or three years ago.

LOW PRIORITY TREATMENT

Interest in fire research and safety was slightly greater in 1971, as the subcommittee held additional hearings on a bill which was expanded to include establishment of a Fire Research and Safety Center. The Presidentially-appointed National Commission on Fire Prevention and Control, authorized by the 1968 act started operating in 1971. Miller and Representative Jerry L. Pettis (Republican of California) were the congressional Members appointed to the Commission. Davis was later appointed. The Bureau of Standards budget was increased to allow for a little over \$1 million in 1971 for fire research work.

The subcommittee hearing in 1971 was terribly short—less than an hour in length on one day—and the feeling of the subcommittee did not appear to be overwhelmingly enthusiastic. It was more like a

rambling bull session, which with the material inserted for the record by NBS consumed only 15 printed pages. Chairman Miller attended the hearing, but his contribution was limited to several observations about regulations on burning trash in backyards and the research of a California friend in the control of fires caused by nuclear fission.

The authorization bill for the National Bureau of Standards activities in carrying out both the Fire Research and Safety Act and the Standard Reference Data Act were combined in 1972. Davis again chaired hearings on the bill on February 17, 1972, and it moved quickly through the legislative process, breezing through the House on April 25 with no opposition. The National Bureau of Standards was also allotted over \$4 million for fire projects in 1972, still a pitifully small amount to cope with such a huge problem.



The National Bureau of Standards carried out pioneer research in developing fire-resistant materials for buildings, with limited funds.

CONGRESSMAN STEELE CARRIES THE BALL

Early in 1972, it became apparent to some Members of Congress, particularly Representative Robert H. Steele (Republican of Connecticut) that more aggressive action would have to be taken to stem the rising loss of life and property caused by fires. Steele advocated a Fire Academy, akin to the FBI Academy, for training fire officials in the most advanced techniques, and offered a comprehensive education program to alert the citizenry on the serious dangers which might be avoided through precautionary steps.

Mosher, after a number of conversations with Steele, became convinced after passage of the new authorization bill in April that the committee should be doing a great deal more in the area of fire safety. On May 1, Mosher wrote a pointed letter to Chairman Miller, urging that the committee hold additional hearings on fire safety and in particular consider new legislation which Steele had introduced and had been referred to the committee. Mosher added this about Congressman Steele:

I can testify not only to his intense personal interest in this area but, in addition, to the impressive effort that went into his work. In fact, in the preparation of the bills he assigned four of his staff members for four months full time in researching the field.

Mosher and Steele also talked with Davis, who agreed to hold the hearings if they met with Miller's approval. The green light came in the early fall of 1972 as two days of oversight hearings were held by the subcommittee to coincide with National Fire Prevention Week.

MILLER THROWS A BLOCK

Steele was the lead-off witness on October 10. He outlined his plans for an academy, criticized the antiquated clothing and equipment available to most firefighters, and asked for a NASA-type coordinated nationwide drive for better fire safety and better design of buildings to prevent the rapid spread of fires. Steele observed:

I would say that most fires are not an act of God such as a hurricane or a tornado. Fires are caused and can be prevented by man.

As a member of the National Commission on Fire Prevention and Control, which annually presented him with a gaudy fireman's hat, Miller seemed to resent the idea that this young whippersnapper of a noncommittee member was barging in and telling him what his committee ought to be doing. When Steele had finished rattling off impressive statistics and innovative ideas, Miller took him to task:

I am surprised, Mr. Steele, that you are not familiar with the fact that this committee has gone into this matter in great depth. * * * The implication is that we

have set back and done nothing about it. We have done and are trying to do something about it. * * * It is easy to tell us—all the statistics you have given us here we have from the hearing on our bill. * * * So I applaud you for the vigor that you are showing here, but I do want you to know that, in spite of how you feel about it from some of the implications of your statement, some of your colleagues in Congress are conversant with it and have been trying to do something about it during the last five years.

Mosher smoothed things over by commenting:

I think our colleague from Connecticut has presented some very dramatic and convincing testimony as a keynote for these hearings.

Miller quickly demonstrated that he was completely bipartisan in his treatment. When Subcommittee Chairman Davis suggested that in Atlanta, a useful fire test had been conducted in an abandoned hotel and more such tests should be carried out, Miller shot back:

It is all right to get up and preach about these things, but can you get the money to actually do it?

Goldwater, on behalf of himself and five California Republican colleagues, testified on October 11 in favor of use of satellites by NASA to spot and more effectively fight forest fires. He suggested NASA should concentrate its expertise on fire-resistant clothing, breathing apparatus, and communications equipment for firemen. Most of these recommendations were carried out as NASA extended its spinoffs for the benefit of all mankind.

"AMERICA BURNING"

During the 93d Congress in 1973 and 1974, the committee activity on fire research and safety was considerably expanded. Over 85 bills on fire safety were introduced at the opening of the 93d Congress, all being referred to the Science Committee. Davis introduced his own bill, with 24 bipartisan cosponsors, on March 14. The Davis bill set up a U.S. Fire Academy and also a Fire Research and Safety Center within the Bureau of Standards. Scarcely had the ink dried on the Davis print when intensive lobbying started on Capitol Hill. The National Commission on Fire Prevention and Control, with encouragement from local firefighters throughout the Nation, had more grandiose ideas about what should go into a bill. The Commission was just completing a dramatic report, to be entitled, "America Burning," which unveiled a broad new program to be placed in a new U.S. Fire Administration within the Department of Housing and Urban Development. The annual spending level was set at \$15 million—an unheard-of high level of concentration at that time.

The Fire Commission began contacting committee members to ask them to hold up on the Davis bill until completion of the Com-

mission report and recommendations. A telegram along the same lines was sent to Davis. Davis immediately wrote a friendly note to the Chairman of the Fire Commission, Richard E. Bland, stating:

Let me assure you that I have no intention to rush through a fire bill before the Fire Commission has been heard from. I think you know that I have had a long standing interest in fire research and education. As a principal sponsor of the Fire Research and Safety Act of 1968 I helped establish the Commission which you chair. I have followed the work of the Commission through our former chairman, Congressman George P. Miller, and I was pleased when the Speaker saw fit to appoint me to the Commission last February 5th. * * * I share with you and the other members of the Commission the conviction that there is an urgent need for additional effort in the fire research and education field. I hope we can work together toward the achievement of that common objective.

At the same time, Davis wrote a note to all committee members and cosponsors of his bill, affirming that he did not intend to rush the fire hearings until publication of the Commission's report. He added:

I expect that the Commission Chairman and other officials will appear before the subcommittee and that the Commission's proposals will be given careful consideration along with the other proposals before the subcommittee.

At the end of April, when the Commission's report and specific legislative recommendations were ready, Howard D. Tipton, Commission executive director, delivered a copy to the subcommittee and asked Davis to join in a televised press conference and luncheon which would provide a glittering launching pad for the report and the bill based on it. Further to attract Davis to get on board was the fact that Senator Warren G. Magnuson (Democrat of Washington) had accepted an invitation to be a costar at the proceedings. Tipton slipped the word that Peter Hackes of NBC was helping with the arrangements and that national press coverage was expected, drawing the attention of firefighters and the general public throughout the country. Despite all the attractions, Davis declined to be drawn into the net. The Commission instead enlisted Representative Wright Patman (Democrat of Texas), chairman of the House Banking and Currency Committee, which would probably get jurisdiction over the new agency if it were established within HUD. Nevertheless, Davis had no fight with the Commission and asked Bland and Tipton to testify on the opening day of his subcommittee hearings at the end of July and early August 1973.

The July-August hearings of the Davis subcommittee drew huge crowds which jammed the main committee room. When the final version of the bill was developed and brought to the House floor on April 29, 1974, it included authorization for a U.S. Fire Academy and a Fire Safety Bureau in the Department of Commerce, a Fire Research Center in the National Bureau of Standards, and expanded efforts in

burn treatment to be undertaken by the National Institutes of Health. Mosher, who handled the bill for the minority, paid special tribute to Congressman Steele, whose "knowledge, expertise, and specific proposals have been invaluable as groundwork in our drafting of this bill."

When the bill reached the floor, the Interstate and Foreign Commerce Committee pointed out that the burn treatment provision interfered in the jurisdiction of the Subcommittee on Health headed by Representative Paul G. Rogers (Democrat of Florida), so Davis agreed to an amendment deleting the \$2 million authorization for that purpose.

EXPANDED FIRE SAFETY LEGISLATION PASSED IN 1974

There was very little vocal opposition against the bill, aside from Gross and Representative William F. Goodling (Republican of Pennsylvania), both of whom quizzed Davis closely on where the money was coming from and how it was to be used. Goodling told the House:

This is one more instance where emotion takes over and good judgment goes out. * * * I suppose I should have on a bullet-proof vest before I oppose this bill. * * * Tornadoes are very prevalent and I assume that any time now we are going to have a bill to prevent tornadoes.

The Davis bill passed the House, 365 to 12. The conference committee, once the bill had passed the Senate, changed the administrative structure to set up a National Fire Prevention and Control Administration within the Department of Commerce. An indication of the rising importance of the issue was the decision of the conference committee to hike the spending authorization to \$45.5 million over a two-year period. The President signed the landmark legislation on October 29, 1974.

As the new chairman of the subcommittee, Symington scheduled hearings on January 22, 1976, to extend the authorization in the 1974 act and also take a look-see at how well the new agency was performing. Symington voiced his displeasure with the low level at which the 1974 act had been funded (less than half the two-year amount authorized \$18.8 million). He added:

I believe we are not quite satisfied that the direction we have indicated has been followed vigorously. Money is a problem, of course. The purpose of these hearings is to identify the degree to which the Federal Government has decided to come to grips with the mandate of the law.

Both Symington and Esch expressed regret that the jurisdictional hassle with the Interstate and Foreign Commerce Committee had probably resulted in the lack of action in implementing the plans out-

lined in 1974 for a burn treatment center at the National Institutes of Health.

The leadoff witness in the 1976 hearings was Howard D. Tipton, appointed by President Ford as the first head of the National Fire Prevention and Control Administration. Noting that Tipton has been executive director of the National Commission, Symington stated:

So even though we changed the name of the game, the captain still runs the team.

The subcommittee was critical of the slow progress, and Fuqua said:

I am somewhat disappointed that we have not accomplished more. Maybe that is impatience on my part, no reflection on you and your people, Mr. Tipton. However, I am very much in support of this and I hope we can have maybe more progress than we have had before.

Tipton candidly indicated:

I have to say that without budgetary constraints my personal feeling is yes, there should be a significant effort, but I must also recognize the role that I play here in the administration and the concern for fiscal policy.

DOUBLING THE AUTHORIZATION

When the subcommittee marked up the authorization bill on March 3, the budgeted requests were roughly doubled to recommend about \$20 million annually for the entire effort. There was some discussion about the proposed Fire Academy. Fuqua's amendment was adopted, to require that Academy construction plans be given to the respective House and Senate committees, subject to disapproval by Congress within 60 days. Although cynics might suspect that Congress was interested in site selection for reasons of patronage or "pork," the committee made it clear in its authorization report that a "modest but central facility" was envisioned. The description was expanded to this definition: "adequate but not excessive facility." Translated into the vernacular, Fuqua informed the subcommittee: "We don't want them building any Taj Mahal." Still, the intense State and local interest in the location of the Academy was well defined when Symington presented the bill on the House floor in March, as he stated:

Interest in the Fire Academy is keen because about sixty Members of the House have written to the Fire Administration recommending sites for the Academy. I hope the fifty-nine Members who are disappointed when the site is selected will not think worse of the Fire Administration.

There was no serious opposition to the authorization bill, although Mosher told the House:

I believe it is true that the Administration is not happy with the additional amount of money represented in this bill. Nevertheless, our committee was unanimously in support of the legislation we are proposing today, including the minority side, and I do personally support the bill.

President Ford on July 7, 1976, sent a tough veto message to Congress which did not mention the doubling of the budget, but strongly objected to the congressional "veto" provision which Fuqua had inserted in the bill. The President blasted the bill "because it contains a provision that would seriously obstruct the exercise of the President's constitutional responsibilities over executive branch operations." Teague, Fuqua, Symington, and Mosher all agreed that the best course of action was to drop the offending provision, and when that was done the bill was quickly passed and signed into law.

During 1977, when Thornton became chairman of the subcommittee, several fire-related issues arose. National attention was focused on the Beverly Hills Supper Club fire, which resulted in the loss of 162 lives. Area Congressmen asked the committee to stage investigative hearings. Thornton decided against separate hearings because the matter was in the jurisdiction of the Interstate and Foreign Commerce Committee. Some congressional interest was also expressed in bills which would extend Federal grants to local fire departments. Thornton indicated that existing legislation had indicated "its intent that the basic support of fire departments should remain the responsibility of States and localities."

FLIPPO AND HOLLENBECK URGE AGGRESSIVE ACTION

The subcommittee had two days of hearings in February 1978 on extending the authorization for the agency which was renamed the U.S. Fire Administration. Thornton turned the gavel over to Flippo, who not only presided over the hearings but also acted as floor manager for the authorization bill when it reached the House floor. Both Flippo and Hollenbeck were sharply critical of the lackadaisical support given to the Fire Administration by the executive branch. Flippo said from the chair during the subcommittee hearings:

It seems to me that we are nearing a turning point. The Congress must decide whether it intends to pursue solutions to the problems of the destructive force of fire—solutions which are commensurate with the tremendous losses imposed by fire in this country—or if the Congress will abandon what I believe to be an essential effort.

Hollenbeck added:

It appears to me that the lack of visible support for the Federal fire program is itself symptomatic of the fact that people of this country are generally unaware of the enormous toll that fire takes. * * * I think the moment is near at hand for Congress to decide whether it seriously intends to mount a coordinated national attack to assist States in combating the epidemic of fire, or whether it will merely continue to pay lip service to fire prevention in this country.

Lloyd said that the old days of volunteer firemen leaping out of stores and homes to run to fight fires was "not very practical in the world today." Instead of that, he advocated:

We have to prevent the source of fire. And the way to prevent the source of fire is that we train people to see where fires are most likely to start, and we do that by education.

The site for the proposed Fire Academy caused some controversy and alteration of plans. The administration finally selected a site at the former St. Joseph's College in Emmitsburg, Md. On September 21, 1978, the House approved a compromise with the Senate which raised the total authorization to just under \$30 million and placed more emphasis on arson losses, particularly arson for profit, through assistance to State and local governments. In 1978, the committee also directed that the U.S. Fire Administration prepare a report on arson prevention and control.

At the close of 1978, the subcommittee had exerted leadership in focusing greater Federal attention on a costly problem which annually resulted in the loss of 7,500 lives and billions of dollars in property. The committee was impatient with the slow progress of Federal authorities charged with the responsibility for education in fire prevention. The problems were identified, but the Congress was far from satisfied with the snail's pace efforts to solve them.

AUTHORIZATION FOR FIRE PREVENTION IN 1979

In 1979, the U.S. Fire Administration was merged into the new Federal Emergency Management Agency. In opening hearings on April 27, 1979, to authorize funds for fire prevention, Brown commented:

It is indeed disturbing that the United States leads other industrialized nations in fire deaths per capita. Other nations, such as Netherlands and Italy, experience only one-quarter of the number of deaths per capita experienced by the United States.

In light of these facts, there was some informal discussion within the subcommittee as to whether huge additional amounts of Federal funds would produce a massive program to reduce fire losses. The subcommittee decided, with one exception, to go along with the budgeted requests because of the problems associated with the establishment of FEMA. The exception was in the area of antiarson efforts. As a result of the report requested in 1978, which made several recommendations on methods of attacking the arson problem, the committee took the initiative in 1979 to include \$5.4 million to fight arson. The committee noted the results of vigorous coordinated community action in Seattle, Wash., where arson losses had been reduced by 50 percent over a two-year span through activities of an arson task force including

law enforcement officials, prosecutors, fire services, political leaders, bankers, and insurance representatives.

When Brown and Hollenbeck brought the fire authorization bill to the House floor on June 4, 1979, under suspension of the rules, no voice of opposition was raised and the bill was adopted without a rollcall. The House accepted a similar Senate bill on November 8, 1979.

STANDARD REFERENCE DATA SYSTEM

"The public is used to thinking of science as dramatic discoveries of new quasars or rocketships to the Moon or breakthroughs in genetic engineering, but does not often hear of the work performed by the Office of Standard Reference Data," Congressman Hollenbeck remarked at the opening of the SRD hearings on February 9, 1978. Congressman Flippo, chairing the hearings, pointed out that without these basic and authoritative data, the individual scientist or engineer would have to conduct a tedious search through all the published literature and on top of that analyze it all before starting to work.

The basic legislation establishing this unsung but necessary program was passed in 1968, thanks to the committee's leadership (see pages 149-150).

On August 3, 1971, the subcommittee met to consider updating the 1968 legislation. Because the extension of the authorization to the Bureau of Standards for the standard reference data system was combined in 1971 with the fire research bill, perhaps it was natural that the committee members found that fire had more political sex appeal. Attention of committee members wandered as Dr. Lewis M. Branscomb, NBS Director, presented his somewhat abstruse testimony. At one point, Dr. Branscomb looked up at the subcommittee members and focused their attention by commencing:

I would not want to startle any of the members of this distinguished committee—

He finished the sentence with better attention—

who might still believe in the infallibility of science, but I must confess that when scientists, or engineers too, make a measurement in the laboratory, they do not always get the right answer. More specifically, since no measurement is perfect, they do not always get as accurate an answer as they claim to have, sometimes by a large measure. * * * If you can find a reliable value in a handbook, you don't have to go into the laboratory and measure it yourself or trust your luck in a value found by a laborious search through the literature.

PRACTICAL APPLICATIONS

Dr. Branscomb pointed out a number of practical applications of the standard reference data system. He stated that a careful analysis of the physical properties of oxygen had helped pinpoint the cause of

the rupture of the Apollo 13 oxygen tank, and a calculation of the amount of heat generated in the combustion of wastes had led to improvement of the design of waste incinerators. Dr. Edward L. Brady of NBS described to the subcommittee the stimulus which this program had also given, through the International Council of Scientific Unions, to the coordinated development of similar programs in other nations.

In his remarks to the House on April 25, 1972, Davis indicated that the Standard Reference Data Act would also result in—

many projects which improve the Nation's capability to respond rapidly to the need for reducing air pollution, improving energy sources and distribution, developing new products, and strengthening technology and science in the United States.

The bill, combined with the fire research bill in 1972, experienced no difficulty in getting through.

In 1975, with Symington as chairman of the subcommittee, NBS Director Dr. Richard W. Roberts furnished this definition of what was involved in SRD:

When a scientist or engineer in the laboratory measures how much heat is given off when a substance is burned, or how fast methane will react with air, or how soluble mercury is in water, the results of his measurement are data. The numerical results of measurements of intrinsic properties of substances are the kind of data we are talking about in the national standard reference data system.

In its 1978 authorization for the system, the Congress increased the authorization upward toward the \$5 million level, and reduced the authorization from three years to two. Science Committee members Teague, Wydler, Flippo, and Hollenbeck spoke for the bill on the floor. They soon found they were talking among themselves as nobody raised any questions and everybody agreed with the committee's recommendations by voice vote.

OVERSIGHT OF NATIONAL BUREAU OF STANDARDS

Allen V. Astin, Director Emeritus of the National Bureau of Standards, commented to Teague in 1978:

A major disappointment to me over the early years of the committee was our failure to develop a systematic program of oversight for the National Bureau of Standards. * * *

The primary focus was on the activities of the National Bureau of Standards in support of the space program rather than on the broader responsibilities of the Bureau. I always felt that the dominance of the interest in the space program prevented the establishment of means for systematic review of our programs.

When Chairman Overton Brooks booked three days of hearings on the NBS in the spring of 1959, he confessed:

I live right next to the Bureau of Standards and although I have been in Washington over 20 years, I have never been in the Bureau of Standards.

During two days of further hearings in May 1961, Fulton advocated that the Science Committee should enact authorizations for the Bureau of Standards. Although both Brooks, and to a greater extent his successor, Miller, had very complimentary words for the work of the Bureau, neither chairman moved toward establishing regular oversight or authorization responsibility. Finally, in 1970, when Miller tapped Davis to chair a small Subcommittee on the National Bureau of Standards, all the earlier talk of what should be done escalated into action. Most of Davis' special subcommittee activities were zeroed in on fire research and standard reference data legislation. Then when Davis replaced Daddario as the new Science Subcommittee chairman, he conducted a comprehensive five days of oversight hearings on the National Bureau of Standards in September 1971. The subcommittee had available as an excellent background for the hearings a 222-page study by the Science Policy Research Division of CRS, entitled "National Bureau of Standards—Review of its Organization and Operation."

In 1972, incorporated into omnibus legislation extending fire safety and standard reference data authorization, the subcommittee amended the Organic Act of the National Bureau of Standards to expand the authority of NBS to assist other nations and international organizations of which the United States is a member. The subcommittee also recognized the fact that Congress through the years had loaded many new responsibilities on the NBS without increasing the funds necessary to carry out the new tasks.

VOLUNTARY STANDARDS

Following the one-term establishment of a Special Subcommittee on International Commercial Standards under Congressman Roush in 1966, oversight in this area was resumed in conjunction with the 1971 hearings on the National Bureau of Standards. During the 1971 NBS hearings, there was a good deal of attention directed to the voluntary commercial and technological standards system in which a large part of American industry participates. To bring this matter into focus, the Science Policy Research Division prepared, at the subcommittee's request, a 122-page report entitled "Voluntary Industrial Standards in the United States—An Overview of Their Evolution and Significance for the Congress." The study was published toward the close of the 93d Congress in 1974. In addition to giving some attention to the metric system, the report also examined the implications of standardization and touched on such points as the inadequacy of voluntary standards for consumer product safety. Much of the legislation required to pro-

rect the public interest in the areas covered by the report fell within the jurisdiction of the Interstate and Foreign Commerce Committee.

SYMINGTON'S BUREAU OF STANDARDS BILL

As chairman of the Science Subcommittee, Symington became increasingly disturbed with the fact that the National Bureau of Standards, in his words, had been "relegated to a rather obscure position and has experienced only marginal growth or change." He charged that being buried deep in the Department of Commerce had resulted in "stagnation." Following the early departure of two Directors—Branscomb and Roberts—after only brief tenures of office, Symington pointedly remarked that the Commerce Department, which he said "functions as an advocate for the business world", might not provide the friendliest of surroundings for a Bureau engaged in developing factual baselines for Federal regulations on highly controversial issues like enhancing the environment.

Confessing that he had not discussed the specific remedy with other members of his subcommittee, Symington threw the Commerce Department into a tizzy in December 1975 by introducing a very simple bill which would sever the NBS from the Department of Commerce and raise the salary of the NBS Director, as the head of a new independent agency. Commerce Department lobbyists converged on Capital Hill to ask everybody but Symington what his motives were. High officials in the Commerce Department burned up the wires to try and find out whether there was any serious support for the Symington bill. Enterprising newsmen finally came around to confront Symington to find out what he intended by his bill. Sphinx-like, Symington responded that he had introduced the bill to "provoke careful thought." Meanwhile, at the Gaithersburg, Md., headquarters of NBS, although the official reaction was of course mum, there was private delight at the prospect of enhancing the Bureau's status.

The roseate glow produced by the Symington bill did not last long. As Symington moved into his senatorial campaign in 1976, there simply wasn't enough time for hearings, the administration did not support the bill, and there was no further action. For Symington and NBS, it was fun while it lasted.

NBS OVERSIGHT HEARINGS IN 1977

The National Bureau of Standards was 76 years old when the Science Subcommittee decided on a one-day oversight hearing on October 25, 1977. Six years had elapsed since the committee had taken the blood pressure, run the customary series of investigative tests, and assessed the vital signs. No hardening of the Bureau's arteries

was evident. But the subcommittee found a badly overworked and underfunded condition which seriously threatened the health of the Bureau. Charles Peck, Vice President of Owens-Corning Fiberglass Co. and chairman of the NBS visiting committee, reported to Chairman Thornton:

NBS is on the brink of serious trouble. The persistent retrenchment that has taken place there threatens to bring NBS to a mediocrity that is unacceptable.

Peck outlined to the subcommittee—

shocking gaps in NBS' ability to carry out its basic assignment, even without supplemental assignments. * * * The declining quality of work is reaching a critical stage. One study indicated that basic research in constant dollars may have dwindled to half the level of 10 years ago. Fifteen new laws since 1965 have given NBS assignments; yet the NBS overall budget in constant dollars has not increased.

In April 1978, Congressman Brown went across the Capitol to testify at additional oversight hearings being conducted by the Senate Commerce Committee. In a thoughtful and wide-ranging analysis of NBS, Brown expressed his concern about the new responsibilities which had been piled onto the Bureau and the adequacy of its resources to meet these new challenges. Teague told the House on June 28, 1978, that starting in the spring of 1980 the committee would hold biennial authorization hearings. Teague stated:

A periodic authorization process will assure that the Bureau of Standards will indeed be able to make its maximum contribution to the scientific knowledge and technology so important to our industrial innovation, growth, and economic well-being.

MATERIALS POLICY RESEARCH

"What do we mean by materials? For current purposes the answer is: just plain stuff to make things with."

Thus spake Congressman Symington in 1976, in a formal address to the House of Representatives, in keeping with his customary distaste for gobbledygook.

Throughout the 1970's, the Science Subcommittee devoted increasing attention to the need for a national policy for materials research. The rising importance of husbanding our energy resources sparked renewed attention to this vital area.

Most discussions of materials policy start with references to that landmark 1952 report of the Paley commission, "Resources for Freedom," in the closing months of the Truman administration. The firm building blocks of that study recall the favorite quotation of the first chairman of the Science Subcommittee, Congressman Daddario, who was wont to say:

The great French philosopher, André Gide, once opened a lecture with these words: "All this has been said before—but, since nobody listened, it must be said again."

In 1971, Chairman Davis approved an initial inquiry into the problem of adequate research and development in the materials area. As was so frequently done, the subcommittee asked the Science Policy Research Division of the Congressional Research Service to research the subject. To some extent, the inquiry was related to studies by the newly formed task force on energy under the Science Subcommittee's wing. Hence, part of the CRS study dealt with materials research in the solar energy field. But the Science Subcommittee was interested in broadening the inquiry, which was done in a December 1972 CRS report entitled "Industrial Materials—Technological Problems and Issues of Congress." The study emphasized how our national materials posture related to American economic strength, national security, environmental quality, international balance of payments, the energy crisis, and the general standard of living in the United States. Under the direction of the CRS, the National Academy of Sciences produced what Chairman Thornton later referred to as a "somewhat more focused" study entitled "Problems and Legislative Opportunities in the Basic Materials Industries." The latter turned the searchlight on materials issues surrounding four basic industrial materials—steel, plastics, forest products, and glass.

MATERIALS POLICY HANDBOOK

While Symington chaired the subcommittee, he asked the Science Policy Research Division to prepare yet another extremely valuable adjunct to the subcommittee's work in this area: a "Materials Policy Handbook"—a 205-page "gold mine" of background information. This handbook, published in June 1977, really covers all you ever wanted to know about materials policy but were afraid to ask. Chairman Thornton aptly observed that the handbook was designed to meet the needs of those grappling with the subject for the first time, who need elementary presentations, as well as those who had had a long familiarity with materials issues and prefer a more sophisticated approach.

Symington and Mosher on June 17, 1976, introduced the National Materials Policy, Research and Organization Act. Symington told the House as he introduced his bill:

It is noteworthy that every commission, committee, group, study or other effort which has surveyed the materials issue since 1950 has indicated the need for restraints, planning and forethought on the use of materials. Yet no Federal administration has ever seriously considered a genuine policy to put restraints into effect. It is easy to see why. Policies which encourage restraints immediately come into conflict with the private enterprise concept and with the production of things people like and have become accustomed to having. Such policies, therefore, are not likely to be popular and, politically speaking, are just plain bad medicine.

Brave words, indeed, from a Congressman who had emerged from a close 1974 reelection campaign, and was a candidate for the U.S. Senate in a race which he lost in 1976.

Every two years, the Engineering Foundation in New York, with the assistance of the National Academy of Sciences, the National Bureau of Standards, and other organizations sponsored a Materials Conference in Henniker, N.H. The Henniker Conference was usually attended by one or more staff members of the Science Subcommittee. In 1976, for example, staff members were given the opportunity at the Henniker Conference to present and discuss with materials experts throughout the country the Symington-Mosher bill and its implications for national policy. In 1978, subcommittee Staff Director Yeager and Anthony Scoville of the staff actively participated in the conference, the theme of which was "Building a Consensus on Legislation for National Materials Policy." Yeager charged the people interested in the subject to get together and agree on a policy and then lobby hard to get it adopted. Scoville chaired a panel on current legislative proposals on materials policy.

The subcommittee commissioned the Office of Technology Assessment to complete two reports late in 1976, entitled "An Assessment of Alternative Economic Stockpiling Policies" and "Assessment of Information Systems Capabilities Required to Support U.S. Materials Policy Decisions." Several other OTA studies in the materials policy area were also requested by or made available to the subcommittee to add to its growing competence in the area. The subcommittee actively involved the General Accounting Office in sorting out the issues involved in materials policy.

At the opening of the 95th Congress in 1977, Chairman Thornton decided to tackle the materials policy issue again—laying the educational groundwork in 1977 and going all out in 1978. On the first day of the new Congress, Teague reintroduced the Symington-Mosher bill. Thornton, Hollenbeck, and Brown subsequently sponsored modified versions of bills to establish national materials policy, organization and research.

"Our energy crisis, which is probably the most consuming matter affecting the American economy today, is largely a materials problem," Thornton remarked at the opening of subcommittee hearings on the subject in June 1977. He added:

While materials and the technology to utilize them appropriately for energy hold our attention almost exclusively at this time, similar difficulties involving materials used for other purposes are, we know, not far away.

By 1978, the materials issue had progressed beyond the study stage. The 1977 subcommittee hearings were primarily background

and informational in nature. Thornton, Hollenbeck, and Brown—the most outspoken subcommittee members—provided the leadership to move the subcommittee to focus on research and development policy in the materials area. Accordingly, the subcommittee held hearings in February, March, and September 1978 on the issues and the new legislation introduced. In a statement on September 7, 1978, Thornton indicated:

As I said last February, this issue is second to none when the United States must import 50 to 60 percent of 39 basic minerals it needs for survival.

Hollenbeck added:

It is extremely important to recognize that the decisions we make today on materials and, I might add, energy, will affect our economy and environment for 30 to 50 years hence while capital facilities and skilled labor representing our technology slowly evolve into the next generation.

After eight years of carefully planned groundwork, the subcommittee held its first full-scale public hearings on the materials policy issue in 1977 and 1978. Through the efforts of the subcommittee, the problems involved were fully aired. At one point, Thornton observed:

It is unfortunate but true that when we talk of a materials problem the response that most often returns to us is a blank stare.

The subcommittee helped to reduce these blank stares in the Congress as well as in the executive branch and to some extent among the general public. The increasing amount of attention directed at the issue even raised the question within the Science Committee as to whether there might be created a Materials R. & D. Subcommittee in the future. As observed by subcommittee Staff Director Yeager:

It is not an issue which is likely to peak and fade away, for like energy, except on a broader scale, it would appear that materials research is going to be a necessary activity of this committee indefinitely.

On September 7, 1978, Teague wrote a thoughtful letter to OMB Director James T. McIntyre, raising the issue of the need for a "high-level analytical capability within the Executive Office of the President" in the materials policy area. Teague put his finger on the crux of the problem:

A key issue, that must be resolved early during deliberations on this legislation, is the question of where to fix responsibility, within the executive branch, for defining and analyzing trends and problems in the materials area. It is imperative that this function be lodged within an institutional structure that will assure continuity and high-level interest in materials policy analysis.

In October 1978, the committee added a materials specialist, Paul Maxwell, to the staff, enhancing the expertise brought to bear on the problem. With the opening of the 96th Congress in 1979, materials

policy was formally transferred from SRT to the jurisdiction of the Natural Resources and Environment Subcommittee. However, SRT maintained an interest and on June 26 and 28, 1979 joint hearings were held by these two subcommittees on a bill principally sponsored by Fuqua, entitled "The Materials Policy, Research, and Development Act of 1979." The Fuqua bill was also sponsored by Wydler, Brown, Hollenbeck, Ambro, Walker and Ritter. When he first introduced the legislation on March 8, 1979, Fuqua remarked:

The essence of the bill is to require the administration to establish a program and means to coordinate the various Federal materials research and development activities. Policy and objectives, as well as strategy for organizations and structures necessary to achieve those objectives, are outlined. A long-term assessment of materials and materials research and development needs are provided for in the bill. * * *

The Federal Government is now putting about \$1 billion annually into materials research and development, as compared to about \$4 billion in the private sector. Yet there exists no formal coordination, and collaboration with the private industry is almost nonexistent. A study last year by the GAO suggests that several millions of dollars could be saved by use of a proper coordination and information system.

Hollenbeck observed, in a March 14, 1979 statement to the House:

I hope, for once, this country will find itself dealing with these critical resource problems in advance of a crisis instead of always riding the roller-coaster of shortage, surplus, and shortage such as we have seen to occur in energy over the last 6 years.

Wydler, in announcing his cosponsorship of the legislation, stressed this point:

We are becoming dangerously dependent upon foreign sources of materials at a time when there is increasing international demand for critical materials. When we must import 58 percent of our needs for the 38 basic minerals which comprise virtually all the metal used in the United States, over the long run the shortage of materials will prove just as serious as energy shortages.

Ambro, who chaired the joint hearings with Brown also underlined that "lack of information exchange alone is estimated to cost millions in duplication and inefficiency" with the various Federal agencies going their separate ways on materials policy.

The two subcommittees also staged a symposium, entitled "Materials of the Future; Their Impact on Our Society", which was held on June 25, 1979. The symposium examined recent advances in materials science and engineering, and discussed the impact of those advances on society. Brown and Ambro dubbed it "an informative and lively session."

Both the Brown and Ambro subcommittees have maintained a close liaison with Representative Jim Santini (Democrat of Nevada), chairman of the Subcommittee on Mines and Mining of the House Interior Committee. Santini took part in the joint hearings at the end of June, and in July his subcommittee hearings featured Brown.

"The Materials Policy, Research, and Development Act of 1979" passed the House on December 4, 1979 by 398-8.

EARTHQUAKE RESEARCH AND ENGINEERING

In 1971, the earthquake in San Fernando, Calif., killed 65 people. The 1906 San Francisco earthquake and fire resulted in the loss of 700 lives, and estimates indicate a repeat of that disaster would mean 10,000 people might die. California Congressmen on the committee have taken the lead in earthquake legislation. On March 29, 1972, Chairman Miller introduced a bill authored by Senator Alan Cranston (Democrat of California) to authorize a modest \$10 million to build up the National Science Foundation program in earthquake research, prediction, and land use priorities to reduce hazards.

During the 1970's, the committee supported and encouraged an expansion of the NSF program. In the NSF, basic research on earthquakes was handled out of the Earth Sciences Division (to push forward the frontiers of understanding of earthquakes) and the applied research was conducted under the research applied to national needs (RANN) program. Starting with an expenditure of \$2 million at the beginning of the decade, the RANN program on earthquakes had expanded tenfold by 1977. Symington, Mosher, Goldwater, Bell, and Brown were chief pushers of earthquake legislation on the committee.

On June 22, 1976, Chairman Symington opened a 3-day series of hearings designed to move forward legislation to coordinate Federal efforts in earthquake hazards reduction. Symington sketched in the history of earthquake research and prediction. He noted that in the Palmdale area north of Los Angeles, geologists had discovered an "uplift" of 25 centimeters above the normal elevation "which many believe to be the precursor of a severe earthquake." He then added:

Speaking of uplift in California, I always thought that referred to the work done by my colleague, George Brown.

Since Chairman Symington was out on the campaign trail, Brown presided over the subcommittee markup session on July 29, 1976, to consider the Brown-Mosher bill to establish a new Office of Earthquake Hazards Reduction. The bill acknowledged that both the National Science Foundation and the U.S. Geological Survey, as well as several other Federal agencies, had responsibilities in the earthquake area. Most of the discussion in the markup meeting involved jurisdictional problems, and it was eventually decided to give the President the authority to designate which agency he wanted to be the lead agency. Goldwater wanted to be more specific:

I have a feeling that we're kind of legislating here in the dark. It disturbs me that we are going to leave this up to the President to decide where this Office is going

to be placed, and really how this is going to be broken out. On top of what we are providing, in authorizing monies, we really don't know where this is all going to wind up. * * * I personally do not like this idea of just leaving it out there and letting somebody in the Executive Branch carve this thing up.

Brown, the pragmatist, rebutted:

Barry, in a perfect world we would have the legislative capability to lay it out in a perfected piece of legislation.

Brown described the solution as "a composite that reflects the thinking of several people * * * in a sense, we have had to finesse it." After further discussion, Goldwater suggested that the new Office be placed temporarily in the Office of Science and Technology Policy until such time as the President decided on its permanent home.

When the full committee met at 8 a.m. on August 10, 1976, Brown launched the markup session with these optimistic words:

We feel that this could be one of the landmark pieces of legislation of this year, although it's not an expensive piece of legislation. Considerable national and international attention has been focused on this subject. The time is ripe, and we think we have a good vehicle in this bill.

After considerable discussion and debate between Mosher and Goldwater, the full committee accepted Mosher's amendment to house the new Office temporarily in the "Executive Office of the President." Mosher argued that placing it in OSTP would "load that office with administrative, executive duties right at the start" since OSTP was a brainchild of the Science Committee set up for advising the President (see chapter XIII).

The Earthquake Hazards bill was taken up in the House on September 20. Under suspension of rules procedure, it failed to get the necessary two-thirds vote. Several Members remarked on the contrast between the speed which Congress had displayed in voting \$25 million for earthquake relief for Guatemala while refusing to take aggressive action for the protection of American citizens against earthquakes.

VICTORY IN 1977

Early in January 1977, Teague and Brown introduced similar legislation in the 95th Congress. Chairman Thornton held a snappy one-day hearing April 20, and convened his subcommittee for a harmonious markup session on April 26. The bill went through unanimously. Dornan had this to say about the staffwork on the earthquake bill:

I highly commend Dr. Thomas R. Kramer for the way he sought out and helped the new members of the committee, particularly myself. Coming from southern California which is loosely referred to as earthquake country, this bill was of great importance to me and my constituents.

Thornton got the bill through the full committee, and then ran into some flak in the House debate. Bauman attacked the total expenditure of \$210 million in a three-year period and was able to enlist 125 Members to oppose the bill. But 229 Congressmen joined to vote for and pass the bill which the President signed on October 7, 1977. The President subsequently established the Federal Emergency Management Agency to which he gave the new coordinating powers over earthquake research. The bill provided for the development of earthquake-resistant designs for structures such as schools, hospitals, high occupancy buildings, public utilities, and dams. It also coordinated the development of a prediction and warning capability, along with planning for reconstruction after an earthquake. As Brown pointed out, great advances had been made through the scientific studies developed in the 1970's, materially improving scientific understanding of earthquakes and to some extent to prepare for or predict them.

DNA AND GENETIC ENGINEERING

When Chairman Thornton pounded his gavel at 9:38 a.m. on the morning of March 29, 1977, room 2318 was overcrowded and the press tables were filled. In firm and clear tones, he summarized in one sentence what his subcommittee planned to do—to examine the science policy implications of the DNA recombinant molecule research issue.

Thornton did not have to explain that DNA stood for deoxyribonucleic acid—the molecule containing the hereditary unit of the cell. Nor did he have to go through the basic, elementary explanation that recombinant DNA research means removing DNA material from one organism and "recombining" it with DNA of another form to enable the creation of new organisms. Those attending the hearing knew that Thornton was talking about "gene-splicing," the source of many emotional and at times sensationalized Sunday supplements and TV spectacles.

Why would this former Attorney General of Arkansas, the year before he ran for the U.S. Senate, plunge into a subject which he himself labeled as "revolutionary and controversial"? Didn't he recall the story told by an Arkansas alumnus of the 1958 select committee, Congressman Brooks Hays, of a campaign visit wherein Hays asked for questions following a lofty discussion of national and international issues, only to have one listener ask: "What we folks in Big Flat want to know is where you stand on evolution"?

Unlike his predecessor as subcommittee chairman, Jim Symington, who had the nettles of MACOS brutally thrust on him the year before he ran for the Senate in Missouri, Thornton deliberately reached out and embraced the DNA issue. For 12 solid days and 1,293 pages of the printed hearing record in 1977 and once again briefly in the spring of

1978, he examined every possible facet of the burning question from its legal, moral, ethical, social, public health, and particularly its science policy implications.

PROBING AT THE EDGES OF KNOWLEDGE

That Thornton recognized the importance of the hearing is clear from his opening remarks on March 29:

True science always stands upon a frontier. It probes at the edges of our knowledge and our ignorance, and we accept its contributions as valuable, its continuation as a necessity.

He went on to explain that we are very comfortable when science tells us how things work and improves our health and produces material progress. But then he added:

From time to time we find or come upon a field of inquiry which fundamentally challenges our concepts of life and nature, which confronts us too directly for our collective comfort or convenience, and yet intrigues us too greatly to ignore.

Thornton contrasted the pending DNA issue with what Galileo confronted. It was bad enough for Galileo to shock his contemporaries by suggesting the "scientifically wrong" theory that the Earth actually revolved around the Sun; what was worse was that Galileo committed heresy as well. Yet even then he was only probing the physical universe. Thornton reflected that most people had a nice feeling of security that science would not disturb them by probing the nature of life itself. However, he noted:

DNA research challenges that presumption as profoundly as Galileo challenged the science and religion of his day. It poses for the scientific community fundamental questions of its role in society. It poses for Government fundamental questions of its role in science. * * *

Consideration of these questions brings us face to face with what I believe is one of the most fundamental issues before policymakers today: the issue of society interacting with science and the determination of the basic social responsibilities for the decisionmaking process.

Hollenbeck, a freshman with less than three months of service in the Congress, responded with statesmanlike maturity:

Mr. Chairman, I'm hopeful that this series of hearings will separate fact from fiction on recombinant DNA research now underway in the United States. * * * A large part of the dilemma facing most citizens is their honest desire to understand the benefits and hazards which surround the scientific endeavor without the distortion or theatrics which 30-second spot news features sometimes attain. * * * The purely scientific questions focus on the development of recombinant DNA research, what it offers in terms of improving the human condition, as well as agricultural applications. The apprehension lurking in the back of many persons' minds is that the same powerful technology which produces such genetic breakthroughs might one day backfire and cause irreparable harm to our environment or to our human race. One purpose of these hearings is to try to shed light on whether such an apprehension is well-founded or is exaggerated.

COMMITTEE DISCUSSION IN 1971

Both Thornton and Hollenbeck referred to the pioneer work which had been done in this field by Dr. James D. Watson, professor of biochemistry at Harvard University. Nobel Laureate Watson sparked the early interest of the committee by delivering a provocative paper at the 1971 meeting of the committee's Panel on Science and Technology. Dr. Watson directed the committee's attention to the tremendous possibilities and also dangers in the nascent field of "genetic engineering"—the rearrangement of the basic substances that determine the heredity of an organism. This was a natural extension and outgrowth of the committee's interest in the life sciences, and related issues such as population growth.

Subcommittee Chairman Davis asked the Science Policy Research Division for a special study of the subject, which was published as a committee print in 1972, entitled "Genetic Engineering—Evolution of a Technological Issue." The report concluded:

The science of genetics is rapidly moving out of the realm of theoretical research and into the more politically sensitive region of applied science.

The report commented on Dr. Watson's warning signals to the committee's 1971 Panel on Science and Technology with a quotation from another Nobel Laureate, Dr. Joshua Lederberg, professor of genetics at Stanford University School of Medicine. Using a totally unconscious double-entendre understandable only to those very close to the Science Committee, Dr. Lederberg stated:

There are indeed tigers within our walls that deserve more immediate attention from our lawmakers.

As time went on, huge strides were made in genetic engineering. Public interest in the area mounted. The low key scientific conferences of biologists and geneticists soon found that microphones were being thrust in front of participants to explain to the public whether or not they were designing Aldous Huxley's "Brave New World." Many scientists, acting through the National Academy of Sciences, expressed a serious concern that DNA experimentation could accidentally produce a new molecule which might result in a highly infectious disease or an increased danger of cancer. The subcommittee wanted to insure that Congress was kept current in the rapidly changing areas of biomedical research and genetic engineering, as well as the science policy issues involved.

THE 1974 AND 1976 COMMITTEE STUDIES

Accordingly, Chairman Davis asked the Science Policy Research Division to update its 1972 study and prepare a further study and

report which would cover the entire area. Included were such matters as creation and manipulation of living cells, prenatal sex determination, control of congenital defects in humans, and efforts to determine how the chromosome structures might be involved in controlling personality traits. The committee published this second report in December 1974. It bore the same title as the 1972 study and was labeled "Supplemental Report I." Because of the wide demand for the 1972 report, the latter was reprinted and incorporated as an appendix to the 1974 study. In releasing the report on December 15, 1974, Davis called attention to the "controversial nature of continued research into certain phases of the genetic engineering discipline."

Once again, in May 1976, the subcommittee made a third request to the Science Policy Research Division to prepare an objective and authoritative report on up-to-date developments in DNA research and its implications. Dr. James M. McCullough, Senior Specialist in Life Sciences at SPRD, prepared the report as he had the prior reports on the subject. Symington, in transmitting the report to Chairman Teague, noted:

It is my hope that the committee will consider holding hearings on this important area during the next Congress.

Teague was bolder in his comments. On March 1, 1977, he released this third report and at the same time announced that Thornton's subcommittee would initiate the first in a series of hearings on the issue. Teague stated:

This is a serious and important matter which involves the freedom of scientific inquiry as well as protection of the public. It has generated a great deal of controversy, some justified, some not. It is also at times an emotional affair, which inevitably means that issues become distorted. Our aim is to look at the research aspects of Recombinant DNA in depth and endeavor to separate scientific fact from fiction in order to give Congress a better basis for making judgments in this area. Clearly, this will also necessitate inquiring into some of the associated social and legal policy questions.

Teague also had high praise for the quality and tone of the report itself, which he felt served the objectives of the committee in presenting a balanced, reasoned analysis of the issues involved:

This report (DNA Recombinant Molecule Research) is comprehensive and unbiased. It has been reviewed by a number of the country's outstanding authorities who represent all sides of the question. It is further an excellent case study of the rapidity with which modern technologies evolve from basic research and impact all society. Such issues dramatize the need for the Congress constantly to be aware of any developments in science. They also indicate a potential need for innovative processes to secure public participation in the development of science policies.

THORNTON HEARINGS IN 1977

The Thornton subcommittee hearings spanned a 6-month period in 1977. More than 50 witnesses testified. Like the two-way flow of waves and undertow, hope and fear were recurrent themes: the excitement of discovery and its promise, yet the fear of the consequences of tampering with the nature of life. The subcommittee moved resolutely into the midst of this jungle of the unknown, learning about the basic biological factors, discussing the risks and benefits of DNA research, examining the actions taken and proposed by the Federal Government and private industry as well as other countries, and testing the legal and ethical implications for science and society. The subcommittee also aired the guidelines promulgated by the National Institutes of Health for the physical and biological "containment" of federally sponsored research in order to safeguard public health.

In releasing the final report on the 1977 hearings, Thornton stated on April 3, 1978 that DNA research should continue to move forward in a "positive and careful fashion." He added that the burden of proof regarding the degree of potential danger "in this controversial issue" rested not only on those favoring extension of the research, but also on those who opposed it.

Thornton also indicated that the NIH guidelines need to be "judiciously applied," a phrase which also reflected Thornton's approach to all issues. He warned:

At this time we are dealing with basic research—not genetic engineering or health research or drug research or agricultural research or any other applied R. & D. This is an effort to acquire fundamental information presently unknown. Placing restraints on such endeavors is a delicate matter. It is not unlike placing restraints on free speech—and indeed, we cannot be sure that we are not involved here with certain First Amendment protections. Experts disagree on that point.

Still another thorny issue arose while the 1977 hearings were in progress. Many Congressmen were introducing bills which were not only regulatory in nature—the traditional province of the House Committee on Interstate and Foreign Commerce—but which also went to the roots of science policy, basic research, and the relation between science and society—the jurisdiction of the Science Committee. Even before the landmark 1977 hearings had been completed by the Thornton subcommittee, Teague on May 3, 1977, requested that any bill pertaining to DNA research reported out of the Commerce Committee should be sequentially referred to the Science Committee. The presence of Science Committee members Ottinger, Scheuer, and Waxman on the Commerce Committee helped insure that good liaison was established. Sequential referral was granted in response to Teague's request. This set the stage early in 1978 for Science Committee consideration of a

regulatory bill which had emerged from the Commerce Health Subcommittee chaired by Representative Paul G. Rogers (Democrat of Florida).

CONSIDERING NEW LEGISLATION ON DNA

On April 11, 1978, at 8:10 a.m., Thornton convened his subcommittee for a one-day hearing on the bill which had been sequentially referred. The central purpose of the bill was to extend the protective guidelines established by NIH for federally funded research to all other private DNA research in order that all inquiries would be conducted under the same ground rules. Thornton observed that "the most recent scientific evidence indicates that the probable risk of recombinant DNA research is much less than we once thought." He added that "science advances much faster than the legislative process," which he concluded was probably good for the country, because "had the legislative process moved more rapidly a year ago it might well have been a grave mistake."

Another reason for the legislation was to "preempt" State and local jurisdictions from passing anti-DNA bills which were more restrictive than a moderate Federal law. Everybody had in mind a tough DNA ordinance which had been enacted in Cambridge, Mass., the home of Harvard and MIT.

The Science Committee was under the legislative gun; under the terms of the sequential referral of the Commerce Committee bill, a deadline of April 21 was set for the Science Committee to report. The committee hit the date right on the nose, only after a hectic period of discussions and a stormy pair of markup meetings in both the subcommittee and full committee. In Thornton's absence for the Arkansas campaign, Fuqua shepherded the bill through both the subcommittee and full committee. Hollenbeck successfully put through several amendments to strengthen environmental protection provisions and to require the analysis of science policy lessons learned as a result of the DNA controversy. The most serious argument occurred over McCormack's contention that "it sets a dangerous precedent for the regulation of scientific research in the absence of conclusive, or even demonstrated, significant danger." McCormack also wrote dissenting views which objected to provisions of the bill which he said were "an open invitation to frivolous, time-consuming, cruel lawsuits."

In order to avoid any jurisdictional clashes with the Commerce Committee, both Teague and Fuqua warned they would raise points of order against any attempt to amend the bill in such a way as to invade the regulatory jurisdiction of the Commerce Committee. As Fuqua put it, he did not want any "major surgery or genetic engineering" done on the bill.

As it turned out, the legislation was quietly buried in 1978, after a hearing was unsuccessfully requested before the Rules Committee in July.

The fact that the 1978 legislation was not enacted did nothing to minimize the importance of the comprehensive hearing which the subcommittee conducted and eight years of careful committee work carried forward in the field. Reflecting on the DNA research inquiry, Thornton observed just before he left office in 1978:

It was our aim to bring into focus the best knowledge relating to DNA research. At the time that we were beginning this series of hearings, the voices were rather loud and hysterical among people who could only see the hazards and fears concerning recombinant DNA research. Our purpose was to have a forum in which we would fully explore the risks, whatever they might be, also the science policy questions and the benefits which might be achieved by DNA research.

Thornton concluded:

I think the presence of our full and complete hearings on DNA research acted as a stabilizing influence on the entire Congress.

In 1979, the committee once again prevailed upon CRS to update its analysis of DNA research.

GEORGE BROWN AND GUAYULE

Some Congressmen work and wait for years before their ideas ever come to fruition by surviving the perils of the legislative process. Early in 1978, California's George Brown, sixth-ranking member of the Science Committee, introduced a bill called the "Native Latex Commercialization Act of 1978." The exact title and substance of the bill did not survive, but the general principles did. President Carter signed the bill into law on November 4, 1978. What was the secret of Brown's success? To be sure, Brown had tried to do something for guayule for many years. But why was he successful in 1978?

There is a dusty, two-foot high shrub resembling sagebrush which grows in the semiarid regions of the Southwest called parthenium or guayule plant, from which can be obtained a native latex rubber. Brown had a longstanding interest in the possible development of a native supply of rubber. He knew that during World War II around Salinas and Bakersfield, Calif., some 9,000 workers and 1,000 scientists were producing 15 tons of rubber a day from guayule. He was also acquainted with some of the research work being done on guayule at Los Angeles County Arboretum, and an engineering group in Pasadena. Along came the National Academy of Sciences in 1977 with a report on guayule, following a two-year study, which was favorable. But additional research was needed to improve the genetic strain, to

grow and harvest guayule so it could be commercialized for a profit, and meet the needs for high-grade rubber.

The more he looked into the idea, the more appealing it became. During World War II, when Japan had cut off our supply of imported rubber, we set up a synthetic rubber industry. But synthetic rubber requires hydrocarbons derived from petroleum, and OPEC prices make synthetic rubber less and less competitive. Brown also realized that our imported rubber from Malaysia and other equatorial, rainy countries was getting more expensive and was increasing our balance-of-payments deficit by nearly \$1 billion a year. So he figured: Why not help guarantee our future supply of rubber, provide jobs for people in the Southwest, help our balance of payments, and use applied scientific talent to make it profitable?

THE PHILOSOPHER-POLITICIAN

George Brown, a cigar- and pipe-smoking philosopher who was always looking into the future, also knew how to play politics. He drafted a bill authorizing the Secretary of Agriculture to carry out guayule research activities leading to commercialization, in such a way that it would be jointly referred to the Science Committee and the Agriculture Committee. Then he persuaded the two chairmen of those committees, Teague and Representative Thomas S. Foley (Democrat of Washington), and also "Kika" de la Garza (Democrat of Texas), chairman of the key Agriculture subcommittee with jurisdiction, to cosponsor the bill. Teague was more than normally interested. He knew all about guayule from his own experience. Also, the Texas Agricultural Experiment Station at Texas A. & M. University, Teague's alma mater, was doing research on guayule. The longtime chairman of the House Agriculture Committee, Representative W. R. Poage (Democrat of Texas), had been a champion of guayule use for many years. When he learned that Congressman de la Garza while in high school used to work weeding the guayule bushes, near his home, Brown talked with him in terms of holding joint hearings on the de la Garza-Brown bill. He got an enthusiastic response, and the joint hearings were held on June 19, 1978, which is fairly fast timing.

It did not take too much effort for Brown to interest his subcommittee chairman. Thornton, along with Brown, was already a member of the Agriculture Committee, and his interest in agricultural research was deep and genuine. Thornton immediately grasped the energy and economic implications of the bill, and gave it strong leadership at all stages.

Brown went out of his way to enlist Republican support for the bill. Hollenbeck, who had developed into an expert on materials policy,

was intrigued with the idea of increasing domestic materials supplies. Brown unearthed a 1930 study done by then Maj. Dwight D. Eisenhower, who had done a paper on the subject, including this quotation:

We are personally convinced that under real encouragement the production of guayule rubber would develop rapidly into an important industry in the United States.

OVERCOMING NEGATIVE OBJECTIONS

One fly in the ointment was that the executive branch was apparently opposed to the bill. A letter from the Department of Agriculture to Chairman Foley of the Agriculture Committee said the whole question should be put through the budget process "where the program's needs would be judged in competition with other research priorities." The Agriculture Department also tried to be a spoilsport by darkly indicating that the National Academy of Sciences reported there should be a feasibility study, technology assessment, and environmental impact analysis of guayule before action. To Brown, these were delaying tactics. He prepared to give them a one-two punch in the public hearings.

The spokesman for the Department of Agriculture talked in circles about how important this research program was, and that it was gradually moving upward on the priority list and might be funded at some future date. Brown devastated the witness by observing:

That was what I was told 15 years ago when I went to the Department to see if they would be interested in a guayule program.

Round and round they went. Brown was assured that the Department would continue to give the question "high priority." This prompted Brown to ask whether "possibly your motivation to continue to examine this with a high priority might not be increased a little if the Congress indicated its interest by the passage of this legislation." The spokesman allowed that "Certainly the Department of Agriculture is very interested in direction given by the Congress."

To more talk from the witness about budgets and inflation, Brown shot back:

We have felt that one of the best ways to control inflation was to avoid sending billions of American dollars overseas for some of the things we can produce in this country.

Later in the day, the staff director of the National Academy of Sciences study, with prompting from Brown, testified it would be a good idea to go ahead with the program outlined in the bill.

Aided by testimony from the Bureau of Indian Affairs, Brown amended his bill to encourage and enlist Indians on reservations to grow and harvest guayule as a cash crop and source of employment.

Now it was a race against the clock to get the bill through the two committees in time for consideration by both the House and Senate before Congress adjourned on October 14. Getting members from two committees together late in the summer was difficult, but a joint mark-up between the Agriculture and Science Subcommittee was successfully arranged for August 1.

SUCCESSFUL JOINT MARKUP SESSION

The staffs of the two subcommittees produced a substitute draft which slashed the authorization originally proposed by Brown from \$60 million to \$35 million over a three-year period, and added other amendments suggested during the hearings. Unblinking, Brown immediately stated to Chairman de la Garza: "Mr. Chairman, I will accept the substitute." He elaborated that the time was ripe to move. He explained:

Some encouragement was given to the Department in the new crops section of the Agricultural bill which was passed a couple of years ago, but the Department has not taken any initiative. We feel that this legislation will encourage them to move forward beyond the minuscule programs that they have at the present time.

A week later the full Science Committee approved the bill, with Thornton calling attention to the "strong and positive incentive led by our colleague from California, Mr. Brown." Hollenbeck gave strong support to the bill as attacking at once the problems of balance of payments, resources, materials, policy, and employment, adding:

I think it is time that not only this committee but other committees in Congress focus more of their attention on the development of our own resources, be they mineral or agricultural.

After raising several questions about why additional research was needed, Wydler stated:

Realizing the realities of the situation, where we are in the course of the Congressional session, I'm going to support this legislation in a lukewarm fashion.

Thornton responded:

Your lukewarm support is warmly appreciated.

Brown and de la Garza realized that it was too late to get the bill heard by the Rules Committee, so they worked through the leadership to get the legislation considered on the suspension calendar, requiring a two-thirds vote. Teague and Foley wrote a letter to Speaker O'Neill urging early action. Through the interest of Teague, Poage, and de la Garza, pretty soon the entire Texas delegation, including Majority Leader Jim Wright, were rampantly touting the guayule bill.

Brown had laid the groundwork very carefully. Intellectually, substantively, and strategically, he greased the way so that when the

bill was finally debated in the House on September 19, not a soul stood up to oppose the bill. After explanatory speeches by de la Garza, Brown, Thornton, and several others, the House passed the Brown bill by a voice vote.

SEEKING THE FORMULA FOR COMPROMISE

But Congress had less than a month to go before adjournment, and everybody and his brother had his favorite bill struggling to survive the legislative logjam. Some tough roadblocks remained. The Senate wanted to enact an economic development program and place it in the Commerce Department, which of course the House Agriculture Committee strongly opposed. Luckily, Texas Senator Lloyd Bentsen was handling the bill in the Senate. That made it easier for Teague to persuade him that if Texas really wanted a guayule bill, they had better look at the clock and realize that a conference committee which included the House and Senate Public Works, Agriculture, and Science Committees would be almost impossible to convene that late in the session. Brown also enlisted the help of Science Committee member Robert A. Roe (Democrat of New Jersey), chairman of the House Public Works Subcommittee on Economic Development, to assist in speeding the bill forward.

Everybody was in a mood to move the bill, but it took a long time before the formula of compromise was developed. After strenuous efforts, it was finally concluded that the only solution was to set up a Joint Commission with representatives of the Agriculture and Commerce Departments, National Science Foundation, and Bureau of Indian Affairs to set the policies for pulling together the administration of the program. Only in this way could the jurisdictional interests of all parties be protected. Brown hovered in the wings as this communal marriage was being consummated. Friday the 13th proved a lucky day for Brown, with the House voicing its blessing on October 13. The Senate approved the final version of the bill only a few hours before Congress raced to the finish line of its session on October 14.

VICTORY!

When the President signed the bill on November 4, Brown commented:

This legislation will provide a major economic force for large areas of the Southwest that have been previously unable to establish a local agriculture industry. We will bring modern technology to bear on a product known to the Aztecs five hundred years ago.

Did Congressman Brown rest after his victory? At year's end in 1978 he was very busy urging heads of all the departments and agencies

represented on the Joint Commission to appoint their members quickly. "I am convinced that the need to begin planning is urgent," Brown stated. He was already looking forward to the end of the Federal involvement in the program, and full support by private industry for the venture:

I hope you will share my view that while the Federal government will have to play a strong role for some years to come, the sooner we get started with the Federal portion of this program, the sooner we will be able to pull it out.

Despite Brown's efforts, the administration did not appear to be very eager to get started on a guayule program. Although the Brown bill authorized \$5 million for the first year, the President included zero funds in the budget he submitted in 1979. So Brown took his fight to the House floor. On June 19, 1979, he succeeded in adding \$500,000 to the agricultural appropriation bill to get the guayule program off the ground. Brown always managed to turn up support in useful places. This time it was Representative Mark Andrews (Republican of North Dakota), the ranking minority member of the agricultural appropriations subcommittee, who told the House on June 19:

Some years ago my wife, who was then a high school student, was hoeing the rows of guayule when they were planting them as an experiment at that particular point in time. We would be more than happy to accept the amendment on this side of the aisle because we think it is in order.

OTHER SUBCOMMITTEE ACTIVITIES

At the risk of expanding this chapter into a laundry list, it should be noted that there were a number of other areas which the subcommittee investigated through hearings or background staff inquiries. Starting in 1968, the subcommittee held extensive hearings and has always been concerned with the most effective utilization of Federal laboratories. In the early 1970's, this issue was focused on a Senate-passed bill which authorized a regional system of national environmental laboratories. During his testimony before the Senate Commerce Subcommittee on Science, Technology and Space in April 1978, Brown suggested better coordination among the Federal laboratories:

This complex montage of organizations should be networked into a rational harmonious system if this Nation is to have the optimum benefit of this excellent pool of scientific, engineering and technical facilities and talent.

Early in the decade, the subcommittee became concerned with the fact that many terms used in connection with science policy were either loosely defined, or used with varying meanings. Accordingly, the committee asked the Science Policy Research Division to prepare a report which would lead to standardization of terms. The first such

report was published in April 1972, entitled "Science Policy: A Working Glossary." The glossary was updated on several occasions, notably in 1973, 1976, and 1978.

EMPLOYMENT OF SCIENTISTS AND ENGINEERS

From 1970 through 1974, the subcommittee held hearings on various phases of science, technology, and the economy. In a related area, the subcommittee held extensive hearings in Washington and in Marietta, Ga., and Los Angeles, Calif., on "conversion research and education." As space and defense programs contracted, tens of thousands of aerospace engineers and technicians were thrown out of work. Chairman Davis and a number of other Congressmen pushed for legislation to utilize technology in the civil sector of the economy while hopefully alleviating the problem of unemployed scientists and engineers. Wide disagreement prevailed in the subcommittee concerning the advisability of creating a new Federal bureaucracy designed for what was akin to "scientific welfare." Meanwhile, sparked by Senator Kennedy's leadership, a multibillion-dollar Science Policy and Priorities Act, S. 32, was passed by the Senate in 1972, strongly endorsed as a centerpiece in Senator McGovern's Presidential campaign. Senators Kennedy and McGovern pressed Speaker Albert and Chairman Miller to get the Science Committee and the Davis Subcommittee to act on S. 32 in the fall of 1972.

Senator Kennedy used all his personal charm and persuasiveness to try and sway Miller and Davis. He came over to the House side of the Capitol to have breakfast with Miller in the House Members' dining room. When the scrambled eggs failed to bring home the bacon, Senator Kennedy asked to see Miller privately in his House office. The Senator waited and listened very patiently as Miller gave him a guided tour of his office, pointing out the meaning, history, and significance of each of the gadgets and where they had been obtained. In his customary fashion, Miller studiously avoided getting down to brass tacks to discuss the bill which was the sole purpose of Kennedy's visit. Finally, Kennedy arose and with no outward display of impatience thanked Miller in a most courteous fashion for the fascinating conversation. Miller would make no promises.

The issue soon became entangled with the question of whether the Senate would also move on the OTA bill which the Science Committee badly wanted to see passed. Chairman Miller finally agreed to allow the subcommittee (temporarily chaired by Symington) to hold two days of hearings on S. 32. But it was clear that Miller regarded the hearings as only perfunctory. So did most of the Republicans with the exception of Bell whose congressional district was in the eye of the unemployment hurricane. Since the McGovern influence

in the California primary had contributed to Miller's defeat in June 1972, he was far less than enthusiastic about a measure which McGovern contended was crucial in his Presidential campaign. When Bell emotionally told the subcommittee that his constituents were unhappy with more studies and they were demanding a solution, Miller bit his head off:

Aren't there lots of things the public is not happy about? We are not a bit happy that we have not found a cure for the common cold.

INNOVATION AND PRODUCTIVITY

In 1979, the Brown subcommittee blazed a new trail in an area where there had been little or no exploration, but considerable discussion. On July 2, 1979, Brown introduced the "National Science and Technology Innovation Act of 1979." Cosponsors included Ertel, Watkins, Wydler and Hollenbeck. In explaining the new legislation, Brown stated there were two main thrusts:

First, the establishment of an Office of Industrial Technology within the Department of Commerce, and second, the establishment of a number of centers for industrial technology.

The Office of Industrial Technology would study the role of technology in the Nation's economy and identify technological needs and opportunities that are important to the national economy. The Office would recommend measures to advance U.S. technological innovation.

The centers for industrial technology would be located at universities or other nonprofit institutions. They would conduct research supportive of technological and industrial innovation, assist in the evaluation of technological innovations, advise industry, and train entrepreneurs.

The introduction of this legislation was preceded by several months of intensive investigation and research, as well as several hearings.

In May, Fuqua sponsored a Conference on Technology and Innovation for Manufacturing in the committee hearing rooms. Professor D. Tesar of the University of Florida presented a paper on the weakening of the U.S. position in manufactured goods. He pointed out that although we were strong in chemicals and electronics, there were multibillion-dollar trade deficits in heavy and light machinery.

On June 5, 1979, the Brown subcommittee joined with the 1979 Engineers Public Affairs Forum—a group of 20 national engineering societies holding their annual meeting in Washington, D.C. A panel of four engineers discussed with the subcommittee what the government roles are in encouraging or retarding innovation from the initial stages of basic research, through invention and demonstration, to production engineering. Brown stated:

I am concerned that this country may be losing its competitive edge. Members of the subcommittee share my concern, and we intend to do something about it.

I believe that a new partnership between American industry and American government is essential for us to maintain the Nation's capacity to innovate.

Pease stated on June 5:

Over the weekend, I had an opportunity to talk with two graduating classes as their commencement speaker and took the occasion to contrast the world which they face as high school graduates in 1979 with the world that their parents faced in the 1950's, making comparisons with unemployment rates, inflation rates, productivity rates, and lots of other things affecting their lives.

In almost all of the cases, the problems were tied in in one way or another to productivity. The U.S. simply has lost the dominating technological lead that it had in the 1950's. I think this committee needs to find out why that is the case.

It may be perfectly understandable and perfectly natural, but we need to find that out. And we also need to find out ways to encourage greater productivity gains and innovation in the 1980's.

During June and July, the Brown subcommittee held joint hearings with the Scheuer Consumer Protection and Finance Subcommittee of the House Commerce Committee on the Food and Drug Administration's methods for approving new drugs. Brown stated that one of the several purposes of the hearings was to "give us an understanding of several factors affecting innovation and productivity as may relate to the approval of new drugs in America."

When Representative Paul Simon (Democrat of Illinois) wrote to Fuqua to inform him that he was heading a Budget Committee Task Force on inflation, Fuqua offered his cooperation. On June 26, 1979, Fuqua wrote Simon, expressing his interest in "the interrelations of inflation with innovation and productivity." Brown then teamed up with Simon to schedule a one-day hearing on the subject on July 23, 1979. Brown and Simon commented:

We want to take a look at areas of technology that hold promise for improving productivity. A slowdown in productivity gains has contributed to inflation. Our hearing will focus on the effects of research and development on productivity and their resultant effects on inflation. In addition, we want to find out how inflation itself has affected efforts to increase productivity.

During June and July 1979, related hearings were held by the subcommittee on the role of the Federal laboratories in technology transfer to the private sector and on university-Federal laboratory technology transfer efforts. Watkins headed up a subcommittee task force and chaired the July hearings, as well as exploring indepth the issues raised. One issue explored was the commercialization programs at Federal laboratories, and the extent to which the business community was taking advantage of these programs.

At the end of July and early August 1979, the subcommittee focused on how closer cooperation between industry and the academic community would enhance innovative capability in industry. Later,

field hearings were held as the subcommittee broadened the net of its inquiry.

INTERGOVERNMENTAL SCIENCE POLICY

Down through the years, various subcommittee members and staff have met from time to time with science advisers to Governors, State legislatures or their local counterparts, to stimulate greater interest in and provide guidance for science and technology at the State and local level. For example, Miller served as the Honorary Chairman and delivered opening remarks at the National Action Conference on Intergovernmental Science Policy held at Harrisburg, Pa., in June of 1972. Symington and Davis also addressed the conference, at which representatives of a number of States were present. In his remarks, Miller graphically sketched the stark contrast between his early days when "those of us who lived in the Bay area didn't know much or care much about what was going on in Fresno, or Los Angeles or San Diego" and the interdependence of the modern world in which science and technology had played a major role. Miller and the subcommittee held a special briefing for all Science Committee members following their return. The leadership which the subcommittee provided in this program carried forward also in the strong support which the subcommittee gave to the intergovernmental science program of the National Science Foundation. The NSF helped coordinate further effort at the State and local levels. As mentioned in chapter X on "International Scientific Cooperation," the subcommittee was also very active in encouraging the developing of science and technology both in other countries and through international organizations.

In 1979, the committee voted an additional \$3 million for the National Science Foundation program to help states in building the capacity to use scientific and technical advice in decisionmaking. From June 12 through June 14, 1979, the Brown subcommittee held three days of hearings on "The Role of Federal Laboratories in Technological Transfer to State and Local Governments."

WATER RESOURCES AND AGRICULTURE

Commencing with a 1961 report on "Research Needs for Salt Water Conversion," the Science Subcommittee sponsored a series of reports on water resources. In December 1972, the subcommittee printed a study entitled "What About Water?", which surveyed current research on water resources and utilization. The report included an analysis of the science of river basin planning, as well as review of the work of Federal, State, and local water research laboratories in Louisiana, Mississippi, and California. In 1975, the water resources

and environmental functions performed by the Science Subcommittee were transferred to the Subcommittee on Environment and the Atmosphere.

During the 94th Congress in 1975, as noted in chapter X, Chairman Symington of the Science Subcommittee teamed up with Chairman Thornton of the Domestic and International Scientific Planning and Analysis (DISPA) Subcommittee to hold joint hearings for a special oversight review of agricultural research and development. In 1974, Symington had served as a congressional adviser to the U.S. delegation at the United Nations World Food Conference in Rome. He returned from Rome strongly convinced of the need to explore some of the ways science and technology could assist in solving world food problems. Thornton also served on the House Agriculture Committee and had a longtime interest in agricultural research. In a report jointly issued in August 1976, Symington and Thornton listed a number of recommendations (see chapter X for a discussion of those recommendations which were implemented).

Because of his deep interest in Government patent policy, in May 1978 Thornton had published as a committee print a summary of the hearings which he had conducted as chairman of the DISPA Subcommittee during the 94th Congress in 1976. Thornton encouraged the Science Subcommittee to continue the study after he assumed the chairmanship of the subcommittee, but no further action was taken by the Congress in the area of ownership of inventions resulting from federally funded research and development. In 1979, Ertel was authorized to form a task force within the subcommittee to inquire further into issues of patent policy.

In the early 1970's, the subcommittee had the major responsibility for helping to organize the Panel on Science and Technology, as well as the Research Management Advisory Panel. Both of these panels ceased their activity with the departure of Chairman Miller from the Congress.

During the 92d Congress in 1971, the task force on energy was formed and made responsible to the Science Subcommittee. The activities of the task force on energy are discussed in chapter XIV.

During 1978, the subcommittee made a study entitled "Domestic Technology Transfer: Issues and Options." As Thornton reported to Teague:

Upon assuming the chairmanship of this subcommittee in the 95th Congress, I directed subcommittee staff to maintain continuing oversight of activities in the Executive Branch and appropriate legislative responses to utilize more effectively the results of federally funded research and development. With the plethora of literature and on-going programs in the various agencies and departments of the Executive Branch, I felt it was important for members of the committee to have a comprehensive document to bring focus on current issues and options for action.

In announcing the publication of a report on September 4, 1979, entitled "Interview of National Science Foundation Program Officers," Brown stated:

It is clear from the interview project that the National Science Foundation's program officers are an outstanding group, but the Foundation must stay aware of the quality of the work life of its program officers and take that quality into account in its management and policymaking actions.

The interviews were completed primarily by Dr. Thomas R. Kramer, who scheduled two-hour interviews with each of 25 NSF program officers. The interviews dealt with the role of program officers in preparing the NSF budget, their role in the administration of grant applications and awards, and NSF support of its program officers.

From September 11-13, 1979, the subcommittee started the second round of its hearings to continue its yearlong study of the NSF charter. In announcing the hearings, Brown posed these questions:

How well has the National Science Foundation performed the tasks which Congress set out for it in the basic Act of 1950? What roles, responsibilities, and missions should the Foundation assume in the future? What tools will it need in the years ahead to accomplish its work? These questions will play a central part in public hearings to be held by the subcommittee. The questions were raised by the subcommittee over 10 years ago and now need to be reexamined. Since that time, there have been significant changes in the organization and support of science by the Federal government, and in how citizens view science as a national enterprise. For example, new technology-oriented agencies, like the Department of Energy and the Environmental Protection Agency, have been created to apply the products of science to national needs. College enrollments are declining and changes in science education have occurred or are being proposed. At the same time, while unmatched in Nobel prizes, the country has lost much of the competitive edge that depends on industrial innovation and superior productivity. These changes suggest that we should thoughtfully reconsider the role of NSF in support of science.

During September 1979, the subcommittee also broadened its inquiry into innovation and productivity with field hearings in Harrisburg, Pennsylvania. Brown announced that "because of his keen interest in the issue of innovation and productivity," Ertel would take a lead role in chairing the Harrisburg hearings. Ertel commented:

I am convinced that a good deal of the R. & D. undertaken at the Federal level can be very useful to state and local governments if appropriate transfer mechanisms are in place. I am equally convinced that the Federal Government can and must take an active role in assisting the private sector to improve its innovative and, thereby, its productive capacity.

The subcommittee staff spent many weeks on the issue of science and technology in the White House and the Executive Office of the President. The long and highly successful efforts of the full committee, culminating in the passage of the National Science and Technology Policy, Organization and Priorities Act of 1976, are the subject of the next chapter.

94TH CONGRESS
1ST SESSION

H. R. 10230

[Report No. 94-595]

IN THE HOUSE OF REPRESENTATIVES

OCTOBER 20, 1975

Mr. TEAGUE (for himself, Mr. MOSHER, Mr. HECHLER of West Virginia, Mr. BELL, Mr. FUQUA, Mr. JARMAN, Mr. SYMINGTON, Mr. WINN, Mr. FLOWERS, Mr. FREY, Mr. ROE, Mr. GOLDWATER, Mr. MCCORMACK, Mr. ESCH, Mr. BROWN of California, Mr. MYERS of Pennsylvania, Mr. MILFORD, Mr. EMERY, Mr. THORNTON, Mr. PRESSLER, Mr. OTTINGER, Mr. HAYES of Indiana, Mr. HARKIN, Mr. LLOYD of California, and Mr. AMBRO) introduced the following bill; which was referred to the Committee on Science and Technology

OCTOBER 29, 1975

Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

A BILL

To establish a science and technology policy for the United States, to provide for scientific and technological advice and assistance to the President, to provide a comprehensive survey of ways and means for improving the Federal effort in scientific research and information handling, and in the use thereof, to amend the National Science Foundation Act of 1950, and for other purposes.

- 1 *Be it enacted by the Senate and House of Representa-*
- 2 *tives of the United States of America in Congress assembled,*
- 3 That this Act may be cited as the "National Science and
- 4 Technology Policy and Organization Act of 1975".

Science in the White House

"Doctor, who is your boss?"

Chairman Teague, never known to beat around the bush, disarmingly directed this simple question on July 17, 1973, to Dr. H. Guyford Stever, Director of the National Science Foundation, who had just been given a second hat to wear as Science Adviser to the President. It took all of 77 words for Dr. Stever to answer the chairman's question at a committee hearing. It was not an easy question to answer, because President Nixon had recently shooed out of the White House all of the scientific policy machinery expanded by President Eisenhower in 1957 and more elaborately structured by President Kennedy in 1962. President Nixon's Reorganization Plan No. I, effective on July 1, 1973, abolished the Office of Science and Technology and transferred its functions to the Director of the National Science Foundation. NSF Director Stever in 1973 took on the duties of Science Adviser to the President—reporting initially through the Secretary of the Treasury.

Essentially, Dr. Stever answered that the President was his boss. But the fact it took that many words to explain it is one of the indications why the committee felt concerned enough to hold the hearing in the first place. Dr. Stever carefully explained that he had a letter from the President naming him as Science Adviser, but he noted that as NSF Director he also reported to the National Science Board.

BIPARTISAN OPPOSITION TO SCUTTling OF SCIENCE MACHINERY

The reaction against President Nixon's dismantling of the science machinery in the White House was not a partisan one. In an interview with Teague and Mosher in 1978, former President Ford stated:

I thought President Nixon made a serious mistake in downgrading the science advisory role—organization—and when I was Vice President, I had a meeting with a group of about thirty associations in the various disciplines in science and I first expressed to that group my concern with the Nixon approach and my support for the legislative establishment of a Science Adviser in the White House.

Goldwater noted that the reorganization might have the effect "to deemphasize or to undermine the importance of science and



Dr. H. Guyford Stever, Director of the National Science Foundation, took over duties formerly assigned to the President's Science Adviser when the scientific advisory machinery was removed from the White House in 1973. Subsequently, President Ford in 1976 elevated him to the post of Science Adviser to the President. Here he is shown addressing the committee's Panel on Science and Technology, of which he was a member. At right is Representative James G. Fulton (Republican of Pennsylvania).

technology in this country." During an appearance of Dr. Stever as a witness before the committee, Hechler said to him:

The way to provide overall leadership for an area that is of prime importance is to place it administratively in the White House. This is the very highest level of the Government, and I certainly look with some apprehension at the apparent down-

grading of the role that you must now play, by taking this whole function outside of the White House.

When he remarked that he would have a close working relationship with "the budget examiners who are the OMB people on the firing line," Dr. Stever prompted this colloquy with Symington:

Mr. SYMINGTON. You talk about the members of the Bureau on the firing line. I take it you consider yourself against the wall with them drawing a bead on you?

Dr. STEVER. That isn't quite the way I meant it, sir. There are lots of different firing lines.

Mr. SYMINGTON. Sometimes we think of our projects being blindfolded and lined up.

LONG-RANGE APPROACH OF SCIENCE COMMITTEE

The 1973 hearings, although precipitated by President Nixon's decision, were not simply an isolated instance of calling out the fire brigade to deal with an immediate emergency. They represented only one small chapter in a long series of activities by the committee, and particularly the Science Subcommittee, to insure that science and technology received due attention in the public policy of the American Government. In an official Washington which had become accustomed to the start-and-stop, at times frenetic treatment of public issues which made the headlines, it was somewhat unusual to see a congressional committee develop and apply a truly long-range concept. From the mid-1960's when Daddario and the Science Subcommittee first began to inquire into and advocate a single national science policy, there was a conscious effort to prod both the executive and legislative branches to adopt a realistic, workable, and balanced approach toward science and technology which would enable society to enjoy the fullest benefits. Within the legislative branch, this took the form of such things as the setting up and expansion of the Science Policy Research Division in the Congressional Research Service, the establishment of the Office of Technology Assessment, the expanded use of the General Accounting Office, the increasing attention to energy issues, and the widening focus of the committee's work and jurisdiction in science and energy areas. Toward the executive branch, the committee, working especially through the Science Subcommittee, not only helped upgrade specific scientific programs but more particularly labored to insure that the administrative structure and influence of science and technology were fashioned to utilize their maximum potential.

A NATIONAL SCIENCE POLICY

Following up the subcommittee hearings in 1969 on "Centralization of Federal Science Activities" (see pages 157-159), on June 23, 1970, Daddario introduced House Concurrent Resolution 666. The

resolution expressed the need for a national science policy for purposes of coordination, effective utilization, and continued progress. The resolution also called on Federal agencies having scientific functions to study the desirability of a national science policy and report recommendations to Congress within one year. Daddario, opening hearings which covered a three-month period in the summer of 1970, labeled the question "one of the paramount issues of our times." He read Lindbergh's April 15, 1970, letter which not only stressed the need for technology assessment, but also the necessity for a national science policy. Lindbergh wrote movingly about protecting the environment—a subject which had widespread congressional and public support in 1970 but which the committee moved away from later as energy nudged toward center stage. Lindbergh advised the subcommittee:

But important as National Science Policy is and will become, it seems to me it must be based on even deeper fundamentals of national policy. After all, it is the quality of man we are concerned with, and this is inseparable from his environment—all of it; even major parts are not enough. * * * I think we should establish our policy on the fact that no system of government, warfare, economics, education or religion can be satisfying or successful unless it eventually improves the quality of man.

Although they strayed from Lindbergh's basic admonition, the hearings zeroed in on a central issue which neither the President nor Congress had confronted thoughtfully—how to organize to make science and technology the servants of mankind. The subcommittee report, transmitted by Daddario to Miller on October 15, 1970, is one of the most penetrating and influential documents produced by the committee. Entitled "Toward a Science Policy for the United States," the study furnished the basic building blocks for the legislation eventually signed in 1976 which reestablished the fundamental administrative machinery for producing a coordinated science policy. This was genuine "horizon-scanning."

Daddario stated in submitting his report that the subcommittee was trying "to determine what our national science policy is and what it ought to be." In the three-month period, the subcommittee heard 60 expert witnesses, including present and past Presidential science advisers, and the Nation's outstanding authorities on science and public administration. The subcommittee concluded that the administration should "immediately form a blue ribbon task force to draft a basic national science policy for submission to the Congress no later than December 31, 1971." Daddario painted this dark picture of what would happen in the absence of such action:

The Nation will continue to flounder in its efforts to solve many of the great issues confronting it for want of adequate knowledge and understanding of the issues themselves.

This was probably a good prediction. Daddario also showed rare foresight in pointing out that the situation demanded "a combined legislative-executive effort." Interestingly enough, this is exactly what occurred and was brought to fruition in 1976 largely through the initiative of the Science Committee with the support of President Ford.

Among the other recommendations in the 1970 report were the establishment of OTA, which was done; the upgrading of NSF's institutional grants, which the administration shied away from; strengthening of international scientific liaison, which was done; encouragement of State and local science programs, which was done; and several other recommendations which were only partially carried out. One interesting recommendation, made in an unselfish spirit, was that there be established a centralized jurisdiction over science and technology in the Senate. The subcommittee noted with pardonable pride that the House Committee on Science and Astronautics had a broader jurisdiction over science than did the Senate Committee on Aeronautical and Space Sciences; the report suggested the Senate committee be upgraded. What actually happened is that the House committee's jurisdiction was expanded even further in 1975 to include energy, aviation research, and oversight over all nonmilitary R. & D. Meanwhile the House's counterpart in the Senate not only did not expand, but was soon reduced from a full committee to a subcommittee. Also the scattering of science responsibilities among Senate committees made it extremely difficult for the House to develop legislation on science and technology in conjunction with the Senate, a notable example being the agonizing negotiations necessary to finalize the 1976 act which is the central focus of this chapter.

BASIC RESEARCH AND NIRAS

In addition to the comprehensive report on Science Policy, the subcommittee produced two other influential reports in 1970. The Research Management Advisory Panel completed a substantive review of basic research funding problems which the committee published: "Mission Agency Support of Basic Research." This report analyzed the critical effects of the Mansfield amendment, requiring military research funds to relate to a "specific military function or operation." The report recommended that those high-quality research projects dropped by the Department of Defense be financed elsewhere. As noted in chapter XII, additional funds were made available to the National Science Foundation to pick up some of these projects. It was also suggested that "adequate Federal funding for basic research be sustained so that the United States does not incur a research gap of its

own making." This recommendation helped strengthen the hand of the committee in its sustained efforts to preserve the continuity of support for basic research.

As an offshoot of its study on centralizing Federal science responsibilities, the committee also came up with a unique recommendation in a 1970 report on "The National Institutes of Research and Advanced Studies." The report recommended establishment of a NIRAS to consolidate Federal responsibilities for basic research and graduate education. Daddario labeled NIRAS as "a fresh approach" which "employs commonsense." He also stated:

The fundamental concept of the NIRAS is valuable for an additional reason. It would, in our judgment, do much to refresh the spirit and morale of one of our great national treasures—the colleges and universities of the country. I do not speak here of the difficulties which have arisen due to social unrest and other student disorders. But rather, I refer to the somewhat jaundiced eye which higher education as a whole is beginning to cast on our Federal Government because of its unpredictable, hot-and-cold attitude toward the support of fundamental scientific study and research.

Even though the farsighted concept of NIRAS was never formally placed into effect, and even though the subcommittee was not successful in getting this recommendation fully adopted, the National Science Foundation to an extent adopted some of the concepts involved. And the subcommittee once again was armed with strong weapons in arguing its points in future negotiations with the executive branch.

DISSEMINATION OF SCIENTIFIC INFORMATION

Early in 1970, the subcommittee stepped up its work on studying the storage, retrieval, and dissemination of science information. "The Management of Information and Knowledge" was selected as the central theme of the Panel on Science and Technology which met January 27–29, with McGeorge Bundy, president of the Ford Foundation, and Hon. Earl Warren, former Chief Justice of the United States, as special keynoters. The Panel discussed the impact of the computer and cybernetics communications on society. In the spring of 1970, the subcommittee continued discussions which had been progressing for several years with a special steering group at the Smithsonian Institution, on the subject of how to keep abreast with the rapid developments in the science communications field. In May 1970, an agreement was worked out with Smithsonian and the full committee to cosponsor a study of the application of new methods of science information management to modern urban problems. The actual work on the study was completed in April 1971 by an organization known as the Science Communications Council, headed by William Knox,

vice president of McGraw-Hill, Inc., including both Government and non-Government experts in the field. The study was entitled "Problems of Communication in Large Cities."

As if the subcommittee didn't have enough to worry about, they also poked around in the field of "interdisciplinary research," defined by Daddario as follows:

By this I mean research that combines the intellectual and informational resources of the life, physical and social sciences and engineering.

Once again, the Science Policy Research Division was asked for a report on the issue. The study was published as a committee print in October 1970, entitled, "Interdisciplinary Research—An Exploration of Public Policy Issues."

NEW TECHNOLOGICAL OPPORTUNITIES

In the fall of 1971, after the Congress had voted down the supersonic transport program, President Nixon designated William Magruder, who had been Program Director for the SST at the Federal Aviation Administration, to work in the White House. Magruder was named Presidential Consultant on Technology. He helped work up the new technological opportunities program, the outlines of which President Nixon unveiled to the Congress in September 1971. Mosher was optimistic that at last the White House was turning its attention to the 1970 recommendations of the subcommittee concerning a national science policy, and meeting the need for central, coordinating control in the White House. Despite the publicity which accompanied the new technological opportunities program which Magruder helped develop, when the bells rang and the whistles blew on New Year's Eve, nobody was waiting around for the President to drop the other shoe and proclaim a national science policy "no later than December 31, 1971."

On April 26, 1972, the National Science Board presented its annual report in public hearings before the subcommittee. The Board's report, entitled "The Role of Engineers and Scientists in a National Policy for Technology," really did not go very far toward meeting the prescriptions of the subcommittee so far as either a national science policy or strengthening the White House scientific machinery were concerned. In its hearings on the NSB report, the subcommittee did very little to focus attention on these long-range imperatives. As a matter of fact, most of the discussion when NSB appeared before the committee related to Bell's concern that the RANN program in NSF was not being given enough emphasis.

COMMITTEE MUFFS ITS CHANCE IN 1972

In the fall of 1972, the subcommittee had another chance to focus on the significant, strategic recommendations of the 1970 report "Toward a National Science Policy." The subcommittee muffed the chance. As noted in chapter XII, the subcommittee held two days of hearings on S. 32, "The National Science Policy and Priorities Act of 1972," which had passed the Senate. The September 26-27 hearings were not taken very seriously by the subcommittee, which looked on them as a perfunctory exercise undertaken at the request of the Senate and the Democratic nominee for President. The subcommittee took the position that the bill was not going to get to the House floor anyhow before the end of the 92d Congress. Perhaps this is why the hearings were barren of any serious discussion of leadership for science policy. The Presidential election of 1972 was just around the corner, and the attention of the subcommittee members seemed to be diverted.

THE REORGANIZATION BOMBHELL

Then came the bombshell which resulted in the disintegration of the existing science policy apparatus in the White House.

Reorganization Plan No. 1 of 1973 was transmitted to the Congress on January 27. On January 29, Teague sent copies of the plan and accompanying press statements to all committee members for their information. Dr. J. Thomas Ratchford of the Science Subcommittee staff, in a February 6 memo to Symington, pointed out that the plan had two dangers: (1) Henceforth the National Security Council would take over from the President's Science Adviser and PSAC the function of coordinating scientific advice for the Defense Department; (2) "There is no doubt that the 1973 Reorganization Plan represents an official downgrading of science in the Executive Office of the President and the Federal Government." Dr. Ratchford, however, softened this criticism by noting:

On the other hand, it probably represents a de facto situation which has been in existence for many years. It is not inconceivable that an effective NSF Director who has the ear of the OMB Director and the Assistant to the President for economic affairs could be more effective than some of the previous OST Directors. * * * One cannot know the real effects of the 1973 Reorganization Plan, should it be implemented, for some years.

Chairman Chet Holifield (Democrat of California) of the House Government Operations Committee transmitted a copy of the plan to the committee and other House committees whose jurisdiction was affected. In the absence of any congressional resolution of disapproval by April 5, the plan became effective on July 1.

Davis and Mosher, as chairman and ranking minority member of the Science Subcommittee, were anxious to proceed to hold formal hearings on the implications of the plan. According to Yeager, in a May 3 memo to Teague:

Indications are strong that people are anxious to be heard on the matter—scientists, engineers, industry representatives, government representatives, economists, educators, etc. They are looking for a Federal forum.

Yeager recommended to Teague that the subcommittee proceed with hearings in mid-June or July, as a logical followup to the national science policy hearings which the subcommittee had held in 1970:

The subcommittee has, in fact, been awaiting an occasion for a followup; the current situation offers an excellent one.

At about the same time, Teague was asked to testify before the Bolling Select Committee on Committees (see chapter XV). During his appearance before the Bolling committee, Teague pointed out the strong need for "a central focal point in the Congress where the complete Federal program in support of scientific research and development is studied and reviewed each year." He added:

Until Congress is enabled to see this picture in its totality, legislation endeavoring to deal with Federal support for R. & D. —and that is a sizable endeavor amounting to some \$17 billion per year—will necessarily be a patchwork affair containing a large element of guesswork.

FULL COMMITTEE HEARINGS

Chairman Teague decided that the issue was important enough to hold hearings in the full committee, rather than the subcommittee. Unlike Davis and Hechler, who shook their fists angrily at the White House for what they deemed to be ill-advised actions which downgraded the importance of science and technology, Teague and other senior members of the committee took a very calm and equable approach. On July 5, 1973, Teague announced that the committee would begin a "comprehensive inquiry into Federal policy, plans and organization for the support and utilization of science and technology"—scarcely a very provocative introduction. Teague stated that one of the purposes of the inquiry was to ascertain the effect of the reorganization on the National Science Foundation; this was about as bland a statement as you could make on a move which had rocked the scientific community. When he opened the hearings on July 17, Teague announced that the first phase "will be devoted primarily to eliciting information on the background and status of the current Federal posture on science and technology." That too was a statement carefully calculated not to raise any hackles downtown. There was a method in Teague's approach: he wanted to be sure that out of the action of the

committee would emerge some kind of a joint proposal which could be endorsed by both ends of Pennsylvania Avenue. Privately, it was not anticipated that much could be gained toward restoring the scientific machinery in the White House until President Nixon's successor took office—thought to be $3\frac{1}{2}$ years hence. There was a timeless outlook which motivated Teague and his top staff in planning and conducting the hearings, as contrasted with those whose natural instincts were confrontation, criticism, and challenge.

When Dr. Edward E. David, President Nixon's former science adviser, testified before the committee on July 24, he observed:

Let me answer a question that has been asked me often since leaving the White House. Has science been downgraded? My answer is "no"!

He did concede:

The direct influence of science on societal affairs has.

But the longer he was away from his White House job, the more candid Dr. David became. He was quoted at the January 27, 1975, annual meeting of the American Association for the Advancement of Science as stating:

There was definitely a falling out between the scientific community and the President. One thing you can do if you want to reform an institution is to get rid of it. The White House advisers to Mr. Nixon thought that the scientists were using science as a sledgehammer to grind their political axes.

SYMINGTON AND GOLDWATER ARE CRITICAL

By the close of the July 1973 hearings, other committee members started to get more critical. Symington said at the close of the first phase of the hearings:

It does appear from everything I see before me that the channel for communication is rather scattered at the moment. No one is really there to help the President. What Dr. Stever may have to say is somewhat chopped up by Mr. Shultz, or the possibility exists that his advice will wind up in some obscure office in OMB.

Goldwater reiterated his conviction that "the scientific community would be better served if the director were to report directly to the President." But the most damning indictment of the reorganization came from the last witness who testified in July, William D. Carey, vice president of Arthur D. Little, Inc., and for over a quarter of a century a Bureau of the Budget official. Carey labeled the move as "an impulsive and mistaken decision." His analysis was:

In terming it a mistake, I do so on objective grounds, believing that the Presidency needs staff resources to deal with the problems of choice affecting civil and military technology, arms control, environmental regulation, biomedical technology, and energy R. & D. strategies. By divesting the Presidency of PSAC and OST and diluting the intensity if not the quality of scientific and technical counsel, the implic-

it message is that policymaking has become less complex, that the choices are simpler, and that science and technology are no longer central inputs to national decisionmaking.

Carey also had some sage advice for the committee in terms of improving its effectiveness. When Dr. David suggested that the committee should "monitor" the situation, Hechler clashed with him and growled:

What this committee wants to do is to try and see the structure is sound in the first place so that we don't have to spend all our time monitoring it.

This prompted Carey to advise:

Through pressure, through hearings, through the illumination of the problem with good, lively reports, by keeping the problem alive, and by introducing bills in the area of institutional change, Congress can do a lot more than keep a remote monitoring hand on these situations.

TEAGUE: "WHAT IS HAPPENING AND WHY?"

Teague pointed out at the hearings that in the period from 1965 to 1973, the scientific research and development share of the Federal dollar had declined from 12.6 cents to 6.4 cents. At the same time, inflation had robbed the dollar of over one-third of its value and Federal obligations for research and development had increased nearly 10 percent. Teague told his committee:

Government attitude toward and support of science and technology is not what it was a few years ago. Without presently attempting to define this trend as right or wrong, it is incumbent upon this committee to try to find out what is happening and why.

After the conclusion of the hearings, Teague bided his time. President Nixon was having his troubles with Watergate, and the parade of White House witnesses were appearing before the Senate committee chaired by Senator Sam Ervin (Democrat of North Carolina.) There were some firebrands on the committee who wanted to move in and hit the Nixon administration over the head for downgrading science and technology, and they wanted more hearings to use as a forum for denouncing the 1973 decision.

About this time, an alumnus of the disbanded Office of Science and Technology was asked if his shop had shared in the Watergate episode, and he responded:

No, they didn't trust us enough for anything as important as that. If we had been involved, do you think they'd have been using stone age electronics?

Actually, Teague had planned to hold a second series of hearings late in 1973 to furnish an opportunity for public witnesses from industry, universities, and other outside sources to present their reactions. In keeping with the conscious decision to restrain the

hotheads and proceed in an orderly, objective and reasoned fashion, the committee decided to postpone further hearings until 1974. At the same time, the committee requested three studies on the subject from the American Association for the Advancement of Science, the Industrial Research Institute and the Science Policy Research Division of CRS. This action was in keeping with the carefully patient approach which was based on the conclusion that probably very little could be accomplished to change President Nixon's personal convictions on what kind of science advisory apparatus he really wanted. The committee continued to feel it would be most productive to plan carefully for whatever President followed Nixon.

THE LOW-KEY APPROACH

The almost low key approach to this highly explosive issue was described in coldly clinical terms in the committee's interim report, printed in July 1974. The report described the 1973, first-phase hearings as "status and posture" hearings, and proceeded to this prosaic self-analysis, scarcely calculated to bid for best-seller lists:

The next step is an appraisal of the first phase—and an effort to acquire, from a broad range of sources, fresh observations and views and, if necessary, recommendations for improvement. This should entail not only study and critique of our national science and technology institutions, but an assessment of the causal conditions and forces most likely to shape those institutions in the foreseeable future.

The data poured in, along with scores of letters, articles, resolutions and other opinions from organizations and concerned individuals. Early in 1974, the National Academy of Sciences established an ad hoc Committee on Science and Technology, with a mission to recommend how the relationship of science and technology to the Federal Government could be improved.

On March 25, 1974, Symington, Mosher, and Yeager huddled with Dr. James R. Killian, former Science Adviser to President Eisenhower. Dr. Killian brought along David Beckler, who was directing the National Academy of Sciences study. Dr. Killian, Symington, and Mosher all expressed the hope that the committee would be able to blend the second phase of its hearings with the issuance of the Killian report, and to have one of the compilers of that report as an early witness during the next hearings. Yeager then related to Teague:

Dr. Killian expressed his gratification that the hearings were being conducted in *full* committee, so that all Members would have an opportunity to become acquainted with the problems which exist in this broad-gauge field. He requested that the committee cooperate with his group in the interim and provide each other with such information and data as might be mutually profitable.

Teague strongly endorsed Dr. Killian's suggestion.

As a result of all this, the committee had advice running out its ears. There were reams of questions, observations, challenges, and admonitions, with a foreboding undercurrent of uncertainty about the future status of science and technology in a period of budget squeeze and administrative (not to mention political) uncertainties. Whether or not the country was, in President Nixon's words, "wallowing in Watergate," it was occupying an inordinate amount of time and energy, sapping the national leadership sorely needed.

THE CONGRESSIONAL ROLE IN SCIENCE POLICY

One interesting section of the analysis by the American Association for the Advancement of Science dealt with "Congressional Responsibility," stating:

It is important to stress the need for a stronger Congressional counterpart in the development of national science policy. * * * We feel that a continuous Congressional examination of the entire range of science policy issues is necessary. What was lost in science policy cohesiveness in the executive branch of the government, may be regained by new Congressional initiative.

The AAAS report also recommended an annual report from the executive branch on the "overall state of science and technology in the Nation," a report which was required by the 1976 legislation eventually adopted.

In preparation for the 1974 hearings, the committee also sent a questionnaire to members of the National Academy of Sciences and the National Academy of Engineering, asking their reactions and recommendations. The replies started to pour in prior to the 1974 hearings. Although the results were not tabulated until later, 40 percent of the National Academy of Sciences members responded to the committee questionnaire, and 58 percent of the Engineering Academy members—an unusually high percentage in any league, especially considering the frequency with which those individuals were buffeted with all types of questionnaires and tests. The responses dramatically showed that no issue since the atom bomb and the war in Vietnam had so shaken the scientific community. Emotionally upset, they tried hard to restrain their feelings and furnish scientifically objective prescriptions for what should be done. But there was no doubt that they were demanding remedial action.

Prior to the 1974 hearings, Teague and Mosher wrote to several officials in OMB and NSF to confirm whether or not there had been any significant changes in the organization and operations of the science adviser apparatus over the prior year. Mosher was sufficiently

concerned about this point that he wrote a followup letter to Dr. Stever on June 17, stating:

I note with interest and some concern that neither you nor anyone from your staff will be heard. I suppose that is understandable because of your contribution last year. Nevertheless, it does seem to me that we of the committee would benefit by being brought up to date with your thinking, based on the important experience you have had as Science Adviser to the President during the several very active months which have passed since you last testified here.

Dr. Stever responded with a personal statement which was incorporated into the record. But Teague noted that after checking he was convinced that there had been no drastic changes in the executive science machinery since the 1973 hearings.

THE 1974 HEARINGS

On June 20, 1974, Teague assembled the committee for the second phase of the investigation. He announced that there would be "major emphasis on the views, commentary, and criticism of nongovernmental witnesses." Teague then laid out a very carefully designed future schedule, which was in keeping with the patient tempo which he had set for the entire inquiry. After the completion of the 1974 hearings, there would be "intensive staff study of the information and views received"; then additional written comments would be solicited; there would follow a second interim report with an "advanced set of findings and possibly suggesting alternative courses of action"; finally, there would be a third set of hearings. At the end of all these carefully planned future activities, Teague said there might be "if warranted, the promulgation of legislation to accomplish significant alterations of the system."

Teague called as the first witness in the 1974 hearings Senator Kennedy, who at that time was Chairman of the Technology Assessment Board as well as chairman of the National Science Foundation Subcommittee of the Senate Labor and Public Welfare Committee. Senator Kennedy expressed cautious pessimism about the reorganization. He handled it with kid gloves, observing:

When your committee held the meetings last July to review the results of these actions, the impression left was that it was too early to make a meaningful judgment. I have the feeling that the hearings we are resuming today may leave you somewhat more skeptical about how that process has worked. It seems to me that the lapse of 1 year has not witnessed much positive benefit from the reorganization.

In the first question asked of Senator Kennedy, Hechler observed that "you seem almost to praise the abolition of OST with faint damns." He then asked Senator Kennedy:

I wonder if you would feel that an organization similar to the Council of Economic Advisers set up for science purposes would work within the office of the President.

Senator Kennedy was negative, answering:

I think, Congressman Hechler, it's probably extremely difficult if the President is not willing to support such a reorganization. * * * I think the kind of detailed examination that this committee is performing can probably give us the detailed response in answer to that question.

Senator Kennedy was echoing the thought advanced in the 1973 hearings by William D. Carey:

From my experience in doing staff work for five Presidents, I know there is nothing to be gained by forcing advisory arrangements on a White House that doesn't want them pretty badly. The advice has nowhere to go, and the adviser is frozen out. There is a futility in keeping candles lighted in an empty church.

CAREFUL COOPERATION WITH THE WHITE HOUSE

This concept was central to the committee thinking: any plan developed must be fully acceptable to the White House, and if at all possible worked out in concert with the White House. This is another reason why the impatience of those who saw easy solutions was brushed aside in favor of the careful cooperation patiently constructed between the two ends of Pennsylvania Avenue.

"What is clearly needed is an alternative to crisis-based reactive decisionmaking," Dr. Robert C. Seamans, Jr., advised the committee in his capacity as president of the National Academy of Engineering. Dr. Seamans recommended a Council on Science and Technology responsible to the President. When Fuqua expressed the thought that the NSF Director was in a difficult and conflicting situation, as an agency head "recommending science policy to the President, and maybe stepping on the toes of some of his fellow agency administrators," Dr. Seamans responded: "I definitely see a conflict." Fuqua added that scientific advice to the military was an important feature in bringing coordination and balance into national policy.

Goldwater supported the recommendation of a Council with the observation:

My personal belief is that we need to elevate this whole subject up to the highest level of priority.

On the other hand, Symington, while intrigued with the basic idea, saw red when Dr. Seamans suggested that the Director of OMB might be a good person to head the Council:

I think, from our point of view, it's like giving the cabbages to the goats to care for. It's just that OMB has so many other things to say "No" to, there's no point in adding one more.

During his testimony, Dr. Seamans made this point about the committee and its work:

The hearings, independent studies, documents and Interim Staff Report, which you have commissioned and prepared for Phase I are, I believe, fully indicative not

only of the highest quality, which this committee has always proved capable of, but also indicative of the fact that often it is the legislative branch which is most capable of structuring an open, thoughtful debate of important matters of public policy which affect the welfare of the nation.

Dr. Philip Handler, president of the National Academy of Sciences, noted to the committee that: "your superlative interim report * * * crisply summarizes the record of the past as well as our present circumstances, raises the right questions concerning the future, many more questions indeed than will find satisfying answers." Teague tried without success to get Dr. Handler to speculate on the reason why President Nixon had dismantled the science machinery in the White House, prompting this exchange:

THE CHAIRMAN. I think the reaction from the Members I talked to was one of surprise on Capitol Hill when this announcement was made.

Dr. HANDLER. We were surprised as well, sir.

When Dr. Killian presented the Academy study report, he also had a few comments about the committee work:

I think that the testimony, the studies and the staff critique are important and highly useful documents as we proceed to try to reach conclusions about this national problem. I congratulate the Committee on Science and Astronautics on the depth of its studies and the statesmanlike plan it has adopted for dealing with this important aspect of science in government.

THE KILLIAN REPORT

The Killian report also recommended that a Council for Science and Technology be established as a staff agency in the Executive Office of the President. With regard to the work being assigned to Dr. Stever, Dr. Killian stated:

We view with admiration the gallant efforts of the Director of the National Science Foundation in taking on the additional burden of serving as science adviser to the President, but after careful review we have concluded that this arrangement is inherently in the long run unsatisfactory and insufficient to serve the needs of the Presidency.

The Killian report also recommended that the Council for Science and Technology should participate actively in the work of the National Security Council.

The committee members reacted differently to the Killian report. Mosher asked Dr. Killian a number of critically probing questions, to test whether the White House would accept the proposed mechanism. Mosher's questions, he explains, were those of a devil's advocate, and were designed to elicit strongly positive answers from the witness. Which they did. Symington endorsed the report, concluding:

I applaud your paper and hope that we will come forward with a proper response at this end.

Davis, recalling he had been a "voice crying in the wilderness" when he objected early on to the abolition of the Office of Science and Technology, now expressed his support for the new machinery recommended. Hechler added:

This is really a landmark report and one that I am very excited and enthusiastic about. I certainly hope that this committee can take a very strong and positive stand not only in support of the report but in furthering efforts to make sure that its recommendations are put into legislation or practice.

Unfortunately, the Killian report came the day after Pickle, on the House floor, had led a bitterly partisan attack on the White House staff budget. Wydler and Winn teamed up to needle "some members on this committee who were strongly advocating those cuts yesterday." Pickle responded by saying he really favored a cabinet Department of Science, which McCormack was enthusiastically plugging, rather than any more expansion of the White House. But the long-range influence of the Killian report on the 1976 legislation proved to be much greater than the mixed reaction it received on June 26.

GREEN LIGHT TO DRAFT A BILL

By far the most important development which occurred was that Teague notified Yeager on June 26 that he wanted him to start drafting legislation to improve the advisory, planning, and organizational aspects of Federal science policy. This came as a big surprise, because Yeager and the staff had not contemplated moving into the bill-drafting stage until many months in the future. Teague consulted with Mosher, but there was no general public announcement and other committee members were not apprised of the strategy which was to speed up the process of writing legislation.

When the hearings resumed in July, one of the refreshingly frank witnesses to testify was Don K. Price, dean of the Kennedy School of Government at Harvard University. Price refused to pussyfoot around the question of why he thought President Nixon had abolished the science machinery originally fully developed by President Eisenhower, under whom he once served as Vice President. Brown asked Price if he were "hinting at a situation which many members of the committee probably thought, one way or another was the case—that scientists ended up on the President's enemy list and were banned from the White House because of this." Price responded:

I don't think we really need be at all mealymouthed about the fact that quite obviously, while there were a number of strong Presidential sympathizers among leading scientists, in the academic world the leading natural scientists tended to be very heavily against President Nixon on the Vietnam war and he knew it.

This prompted this Brown-Price exchange:

MR. BROWN. Just to be nonpartisan about it, wouldn't you say that the academic community would have had the same attitude toward President Johnson if he had continued in office?

MR. PRICE. They already did.

TIMING THE LEGISLATIVE INITIATIVE

Congress watchers were eager to discover how the real power-houses on the committee were going to react. Up until the end of June, Teague and Mosher seemed to follow a scrupulously noncommittal course in their observations. Then when the hearings resumed in July, the mood seemed to change. The long-range plan had called for a far longer period of intensive study before drafting legislation.

During the July 1974 hearings, there were some public clues as to what might be in store to speed up the timetable. On July 10, a blue ribbon panel of four former science advisers to the President served as witnesses: Drs. George B. Kistiakowsky, Jerome B. Wiesner, Donald F. Hornig, and Lee A. DuBridge. This powerful quartet lent influential support to the concept that Congress should act. Then Mosher opened up to the public the issue of timing a legislative initiative:

As I understand it, Mr. Chairman, it is your strategy to have our staff prepare legislation which will perhaps embody certain recommendations of the Academy, and use that legislation to hold hearings, to be a lightning rod for further consideration of this, and rather specific consideration of initiatives which we, this committee and the Congress, might take to strengthen the advisory mechanism for science and technology at the White House level. * * * Perhaps this committee could perform a very useful purpose in proposing specific legislation which would give the White House a new opportunity to consider this whole matter, and to give a signal to the Congress that it would welcome a change and a strengthening of this apparatus.

The panelists all reacted very positively to Mosher's suggestion, although they modestly chorused the reminder that they would not presume to be giving "political advice."

Turning again to Teague, Mosher then concluded:

MR. CHAIRMAN, these gentlemen said in general they would not presume to give us political advice. I am going to presume to give you some political advice. I very strongly believe in more congressional initiative, in exerting congressional leadership. I, for one, hope you will go ahead with the strategy you are proposing.

Teague then expressed his philosophy and strategy for action. His instincts told him the moment of decision on drafting legislation was at hand. Yet he wanted to be sure that legislation would have acceptability at the White House. Here is how he expressed it in response to Mosher:

I think the Congress has taken the initiative. Certainly we have had no requests from downtown for this kind of legislation. It seems when the Congress sees a prob-

lem in our country we either pass a bill or appropriate some money and then think the problem will go away, but I would hope we could go very carefully and very slowly. I think all the testimony has indicated that you people, who should know, think our country as a whole, our legislative and executive branches, are not doing what we should in the scientific and technology field. * * * You can take the old horse to water but you can't make him drink. Just to pass a bill, I don't think is the right approach. I think we need to pass something that the President will accept and will use.

Mosher pushed harder. He responded:

I think that our initiative in preparing such legislation, together with the Senate, will give the White House, the new White House maybe, an opportunity to react, and that they might welcome. In other words, we can be a catalytic influence if nothing else.

From that point on, the discussion really took a more positive turn. Martin and Cronin enthusiastically endorsed the idea of pushing forward with legislation, with Cronin suggesting that Congress should provide a magnet, as well as a lightning rod, to pull in support. And as Teague arose to leave because he had to handle a bill on the House floor at noon, he let the cat completely out of the bag. Turning to the witnesses, he announced:

As soon as we have draft legislation, we will be back in touch with you.

The die had been cast. On the next day, July 11, Teague interrupted the hearings to remark to the committee:

We will be in the process of drafting a bill. We hope to get back to you with that bill. We expect to be very careful and go very slowly and get as much input as we can.

THE DELIBERATE STRATEGY

For the gung-ho activists on the committee, the "go slow" strategy was disturbing. It was all so academic, at a time when action seemed required. Those advocating the calm, cool, and collected approach could point to both political and substantive advantages of their snail's pace, however. In looking back at the 1974 hearings, the staff made this observation:

It was about at this point in the 1974 hearings—with a nudge from such people as former Presidential advisers Kistiakowsky (President Eisenhower) and Hornig (President Johnson)—that it became clear we were really dealing with several different issues. We were not just dealing with advice, we were also dealing with Research and Development management including the use and handling of Science and Technology information. It further became apparent that while these were part of the same picture they probably warranted separate consideration and treatment.

After the July 1974 hearings had adjourned, events moved swiftly. Mosher got in touch with Vice President Ford, a warm friend from the many years they served together in the House. Mosher

found him to be "completely receptive" to the idea that the White House science apparatus should be revived. Like his namesake, Speaker McCormack, Congressman McCormack was eager to move forward his plan for a cabinet Department of Science, and asked Mosher to arrange a meeting with the Vice President to present the concept. Mosher set up the meeting which lasted about an hour and was also attended by House Minority Leader Representative John J. Rhodes (Republican of Arizona) and Federal Energy Administrator John C. Sawhill. "It proved to be a very interesting meeting," Mosher recalls, during which Vice President Ford again made a "very real expression of interest" in reversing the decision made by President Nixon.

INTEREST OF FORD AS VICE PRESIDENT

In his 1978 interview with Teague and Mosher, Ford had mentioned that as Vice President he had met with a group of about 30 associations in the various disciplines in science. According to Philip H. Abelson, editor of *Science* magazine, that particular meeting took place in January 1974. Abelson reported:

Wonder of wonders in Washington, he appeared and essentially on time. During the hour and a half of the occasion, Mr. Ford was attentive and responsive. He went as far as he could under the circumstances to indicate that the Nation's science advisory apparatus should be improved.

As Vice President, of course Ford could not be as outspokenly at odds with the President as his private feelings might dictate. Yet as the effects of Watergate began to unravel the Nixon Presidency, Teague and Mosher in particular realized more and more that Ford was an indispensable, key factor in any move to reestablish the scientific machinery in the White House.

There were several reasons for Ford's interest in science. His voting record on scientific matters was spotty—he had voted against establishment of the National Science Foundation in 1950 and helped kill consideration of a metric system study bill in 1962, for example. But generally on the House Appropriations Committee, his interest in military R. & D. was broadening. When asked in 1978 whether service on the select committee had stimulated his interest in scientific matters, Ford responded: "No question about it." At the January 1972 meeting of the American Physical Society, a committee freshman, Congressman McCormack, suggested to Ford that he consider forming a committee of scientists in his congressional district to advise him on science policy issues. Prof. Vernon Ehlers, a physics professor at Calvin College in Ford's hometown of Grand Rapids, Mich., also wrote Ford about the idea, and he set up the committee and met with it on a number of occasions while House minority leader.

Mosher was the prime mover in building a firmer bridge between the committee and Ford as Vice President. As explained by Mosher:

We felt it was inevitable that very soon he would be making decisions in these areas. We wanted to point out that this was an area where he had a chance to be positive and show leadership.

Vice President Ford was sworn in as President at noon on August 9, 1974. The very next day, Mosher wrote him a personal letter, suggesting that he give some thought to reviving a science advisory structure in the White House. Although personally on close and friendly terms with Dr. Stever, Mosher clearly recognized both the personal and institutional problems with Dr. Stever's tenuous position. Mosher commented that Dr. Stever "by nature is not a pugnacious, overly aggressive person." Mosher added:

He's a conciliator. I can't imagine him battering on the door of the White House to see the President if the staff might not choose to let him in.

While in office, Dr. Stever loyally, consistently, and insistently proclaimed that everything was hunky-dory and the administrative arrangement he found himself in made a lot of sense. Not until after it was all over did he candidly confess that all was not sweetness and roses. In a 1978 letter to Teague, in a masterpiece of understatement, he admitted:

It was clear that a closer relationship to the rest of the White House staff and to the President was needed.



Chairman Teague and President Ford always maintained a close friendship.

TEAGUE AND PRESIDENT FORD

During President Ford's first month in office, Teague was called to the White House three times. As former chairman of the Veterans' Affairs Committee and still one of its subcommittee chairmen, Teague was called on as "Mr. Veteran" in the Congress. Science advice or the House committee hearings simply did not come up during the discussion. Teague remarked during this period: "The timetable is slow, there's no hurry, and we won't push." He was determined that Congress write a bill which was acceptable to the President, and he wanted to be sure the administrative machinery would really be used instead of thrown into the garbage can. Teague's decision, shared by Mosher and strongly supported by Yeager, was also based on the fact that President Ford had a host of other problems to face, and the first imperative was to heal the Nation's wounds created by Watergate and its aftermath. The strong personal bond of friendship between Teague and the President, as well as Mosher and the President, motivated them to defer action until the time was right. All three men knew each other well enough to appreciate that sooner or later, they would come to an agreement. In 1978, Teague said to the former President:

I don't know whether you remember it or not. You asked us to write a bill creating a science advisory office, which we did.

Ford responded:

I think that was the outgrowth of my feelings and my more or less individual commitment, Tiger.

YEAGER'S APPROACH

During the fall and winter of 1974, the lengthy, laborious process of drafting and redrafting a bill, digesting and analyzing the mass of material accumulated during the hearings, listening and assimilating the many divergent viewpoints in the scientific community as well as the Senate and the executive branch, went on under the able and experienced supervision of Yeager. At Teague's direction, Yeager enlisted the active collaboration of Daddario, by now the OTA Director, plus any other assistance which Daddario could whistle up. Wells, who worked closely with Yeager during this process, assessed his personal approach in the following terms:

Patient, skillful negotiation, great tolerance in listening to different points of view, a deep understanding of the political process, and quiet persistence have been important factors in Mr. Yeager's strategy of consensus building. A high tolerance for ambiguity, the total absence of any need to be visibly "out front" and a willingness to take a long-range view have been additional personal characteristics important to the success of his endeavors.

In a September 23, 1974, memorandum, Yeager himself outlined the manner in which the committee would proceed with its tedious labors:

It is the intention of the Committee on Science and Astronautics to proceed deliberately according to its original plan. We expect to have draft legislation dealing with the foregoing matters completed within the next few weeks, but this will only be for purposes of discussion and for refinement of the legislation. It is not the committee's intent to push action on any bill without careful and deliberate consideration. Moreover, we would not wish to take any legislative action which dealt with the function or organization of the Executive Office of the President which was not in accord with the thinking and wishes of the President.

During the fall months of 1974 and into the early winter, Yeager and Wells struggled with drafting the bill, reaching out for the advice of many sources for assistance, suggestions, and review. Expert draftsmen in the House legislative counsel's office helped, as did Dr. Franklin P. Huddle and Mrs. Dorothy M. Bates of the Science Policy Research Division of CRS. There were two significant developments in the closing months of 1974 which materially affected the House negotiations: First, the Senate put on a sudden burst of speed and on October 11, 1974, passed an omnibus bill including the Academy of Sciences recommendations plus the main features of Senator Kennedy's old S. 32, the National Science Policy and Priorities Act, and a network of State science and technology offices; second, shortly after Nelson Rockefeller was confirmed as Vice President, he was assigned in December 1974 by President Ford to make recommendations on what form the Executive Office science machinery should take.

BAD NEWS AND GOOD NEWS

For the House committee, this was bad news and good news. It was obvious that the Senate, by proceeding very quickly and with a minimum of hearings, studies, advisory clearances, and careful drafting, was setting the stage for serious conflict with the House—which is exactly what eventually happened. The very good news was that a longtime friend and supporter of science and technology, Vice President Rockefeller, had been given clear authority to pull together policy recommendations by the President. There was a sense of urgency in the fact that President Ford asked for a report from Rockefeller within a month. Now the House committee knew that they would not have to fool around with rumors, stabs in the dark in preliminary studies by the OMB, and fugitive papers which floated around purporting to represent what the President wanted. The centerpiece had to be, in the eyes of the House committee, a specific proposal which was not forced down the throat of the White House but which could be embraced by the President.

A new Congress— the 94th —assembled in January 1975. With newly expanded jurisdiction and a new name, the Committee on Science and Technology flexed its muscles with pride. But at two organization meetings held on January 23 and 30, not a word was said about the important substantive work being carried on, or the negotiations underway with respect to the advisory science machinery in the White House. Aside from Teague, Mosher, and a few staff principals, most Members and those associated with the committee were completely in the dark on what was occurring. The two organization meetings of the full committee were devoted to extensive debates on such mundane matters as proxy voting, the party ratios on subcommittee, and the voting rights of ex officio members of subcommittees.

Meanwhile, over on the other side of the Capitol, Senator Kennedy reintroduced S. 32, which had died with the expiration of the 93d Congress at the end of 1974. Symington was asked by Kennedy's staff to introduce S. 32 in the House, and he informed Teague he would not do so without consulting his chairman. P.S.: he didn't introduce it.

When asked how the House bill was going to differ from S. 32, Yeager said that it "would go beyond the establishment of a White House science advisory system to deal with the way line agencies whose primary mission is R. & D. should be structured and with the gathering and dissemination of science information within the Government."

ROCKEFELLER MAKES HIS REPORT

In February 1975, things really started to move fast. Vice President Rockefeller submitted his report, entitled "Science, Technology and the President's Executive Office," on February 5. The same day Yeager talked by telephone with James M. Cannon, Director of the Domestic Council at the White House— the key man with whom the committee kept closely in touch—and brought him up to date on the draft bill which had now been completed. Teague gave the green light to provide Cannon anything and everything he could use to start working toward a meeting of the minds between the White House and the committee. So Yeager bundled up a huge batch of material—hearings, reports, portions of the draft bill, and analyses. Yeager was careful to add this disclaimer in his February 6 note to Cannon:

It is important to understand that while this material has been put together only after careful study, it is intended solely for discussion purposes at present. The draft enclosed has not been circulated elsewhere and it does not necessarily represent the views of the committee or any of its members. At this point and in the future we will be mainly concerned with obtaining the reactions and views of others with regard to such legislation as may be introduced.

The committee drafting team showed considerable political savvy in putting together both the bill and supporting material. When it was discovered that Rockefeller would be assembling recommendations for the President, the committee staff had CRS analyze Rockefeller's statements and record on science policy. Unearthed was the fact that Rockefeller as Governor had made an extensive "Statement of National Science Policy" on August 4, 1968. The memorandum to Cannon slyly pointed out that Rockefeller had proposed a Council of Science Advisers, adding:

That proposal had been studied with interest. There would appear to be some similarity between the draft provision outlined here and Mr. Rockefeller's proposals in 1968. There are, of course, obvious differences.

THE FIRST TEAGUE-MOSHER BILL

The committee draft bill, calling for a five-member Council of Advisers on Science and Technology similar to the Council of Economic Advisers, was introduced by Teague and Mosher on March 6, 1975. In announcing the introduction of their bill, Teague and Mosher issued a joint public statement emphasizing that their bill should be considered neither a fixed position nor a final product. They added they wanted to invite commentary and criticism in all forums. In a statement on the House floor, Teague was very modest in pointing out that the bill was not by any means "cast in concrete." Unlike so many sponsors of legislation who contend that their panacea will cure all the ills of the world, Teague repeatedly noted that he was simply offering the bill for "discussion and critique," and there would be additional committee hearings later to air everybody's views. He characterized as "wheel-spinning" the process of forcing a science advisory mechanism on the President, which the latter might find distasteful or foreign to his mode of operation.

Yet along with the modesty and humility, there was pride in Teague's recital of the years of careful background work which had preceded the introduction of the Teague-Mosher bill. Teague told the House:

I do not believe it is an exaggeration to describe this legislation as a product of the most thorough congressional scrutiny yet accorded to the focused issue of policy and planning by the Federal Government as to its own role in handling science and technology.

Teague mentioned the 2,500 pages of testimony, data, findings, and recommendations which had helped firm up the foundations of the legislation. He sketched in how important it was to provide a statutory base to bring order and stability to the Government's use of science and technology. He pointed out that science and technology are an

element of our culture as pervasive and important as economics or education or labor or environment. He added that since science and technology were interwoven into all the major missions with which Government is involved, science and technology should also be fabricated concretely and statutorily into the managerial and policy structure of the Government. He decried the ad hoc manner in which the issue had been handled by a succession of administrations. He concluded that a firm policy was needed, plus a dependable and influential advisory system, along with a high-level coordination of those governmental activities relating to science and technology.

In a companion address immediately following Teague's, Mosher succinctly underlined the same points which Teague had made. Mosher particularly mentioned "all of the hearings, studies, reports, seminars, panel meetings, and contractual efforts" which represented part of the "constant, intense attention" the Science Committee gave to problems of science policy, planning, and organization.

The Teague-Mosher bill included a Cabinet Department of Research and Technology Operations as an umbrella, although it preserved those science and technology related activities of mission-oriented departments. This concept related somewhat to a proposed Cabinet department advocated by McCormack.

NUDGING THE WHITE HOUSE TOWARD ACTION

Having informed the Congress and the public of his intentions, Teague now decided it was time to start nudging the White House toward more positive action. The President had been in office for 8 months, surely long enough for a honeymoon. Vice President Rockefeller had not only made his report, but had been subjected to some sniping from the direction of the Domestic Council. There seemed to be a reduced interest at the White House. Teague wrote the President on March 18, 1975, mentioning the Teague-Mosher bill and the discussions with various officials in the executive branch about the bill. Teague pointedly added:

The purpose of this letter, therefore, is to request that we be informed as soon as possible of the nature of your thoughts on the matter and of the appropriate channels through which to discuss them. I know you will understand the indispensable need for me to inform members of our committee on the views of the Office of the President before we take up any legislation. Since it is my intent to lay plans for hearings promptly, I hope we will be able to meet with your designated representatives in the very near future.

Teague continued to encourage further contacts at the staff level, and on May 1 wrote to Vice President Rockefeller inviting him

to help launch the full committee's June 10 hearings on science policy and organization. Finally, the desired activity began to crystalize.

Teague, Mosher, Symington, and several Senators were invited to the White House for a major meeting in the Cabinet Room on May 22. Mosher recalls that President Ford opened the meeting and expressed his enthusiastic support for legislation by the Congress to reestablish scientific machinery in the White House, after which the President indicated he was relying on Vice President Rockefeller to see that this was accomplished. Following the White House meeting, Teague stated:

The discussions at the White House were very fruitful because the President intimated that the Vice President would participate at the opening of the hearings. The President left me with the feeling that he places science policy legislation in a priority category. President Ford told us that he expects to send to the Congress, in the very near future, a piece of legislation similar to the one I have proposed, but dealing only with the science advisory mechanism. This would take the form of a single Science Adviser to the President, located in the Executive office.

Arrangements were soon firmed up for the Vice President's appearance before the committee. The President came through with his special message and bill, but it did not arrive until June 9—the night before the big committee hearing opened.

A DRAMATIC SPECTACULAR

As dramatic spectacles go, the committee scored a great triumph in arranging Rockefeller's appearance on June 10. Trailed by cameramen, illuminated by television lights, surrounded by secret service, the press and his aides, the Vice President somehow made his way through the autograph hunters and willing handshakers up to the front of the main committee room, 2318 Rayburn. Teague stressed the fact in advance that for reasons of protocol, the Vice President would appear as a guest of the committee rather than as a witness. His mere presence focused attention on the fact that the administration was not merely giving lipservice to its desire to have legislation to restore the scientific advisory apparatus in the White House.

But in terms of nationwide publicity for the Vice President's appearance, it proved to be a flop. It just so happened that the very same day of Rockefeller's appearance he also released, with great fanfare, the results of a long study of the CIA and intelligence apparatus by a special commission which he had headed. Naturally, the news media concentrated 100 percent of its attention on the CIA report, without a line of newsprint or millimeter of TV film about Rockefeller's appearance at the committee.



Vice President Nelson A. Rockefeller addresses the Science Committee on behalf of the Teague-Mosher bill to restore the science machinery to the White House.

Yet while it lasted, it was a unique experience.

For 20 minutes after his arrival at 9:45 a.m., Rockefeller extended his "Hiya, fella" form of personalized greeting to all the committee members, staff, and other visitors. At 10:05 a.m., Teague rapped his gavel, turned the microphone over to his distinguished visitor after a very brief introduction, and promised: "We will guarantee you, you can leave here at 10:45." Right on the dot, Teague abruptly adjourned the session when 10:45 arrived.

In the 40 minutes in between, the Vice President noted that in the 35 years he had testified before congressional committees, starting for President Roosevelt, "I have never sat on this side of the room before." He paid his compliments to Teague and Mosher for their support of science, and added this appraisal of the committee:

This committee has been really out front for the Nation, and I think can take a great deal of the credit for the tremendous progress we have made.

He mentioned briefly the dismantling of the machinery in 1973, without referring to President Nixon by name. After mentioning that President Ford had asked him to study the problem, Rockefeller said: "His predecessor, for reasons we all know, had canceled the arrangements that had been started under President Truman, that evolved over a period of years under various Presidents * * *." Once again, he noted: "Then, as I say, for reasons we understand, this was terminated,

and President Ford wanted to take a fresh look at the whole scene * * *."

The Vice President mentioned that the bill sent up by the administration proposed an Office of Science and Technology, headed by a Director who would serve as the President's Science Adviser. He resurrected an old familiar term when he suggested that the Science Adviser "would provide an early warning system to the President * * *." He delighted his listeners by adding:

Probably the thing that the science community was most anxious, and which I think is most important, and I know you ladies and gentlemen all feel that, is that he not only must have access to the President, but he must also have access to the White House staff and organization which is preparing and doing the staff work for the President, whether it is the National Security Council or the Domestic Council.

INTERNAL DEBATE IN THE WHITE HOUSE

During the question period, Mosher and Symington, both of whom had been at the May 22 White House meeting where there was some debate about whether or not the Science Adviser should be subject to Senate confirmation, raised the issue again with the Vice President. Rockefeller candidly revealed the nature of an internal debate going on within the White House in the following exchange with Mosher:

MR. MOSHER. And you believe the White House is leaning toward confirmation of this person by the Senate, although it is not mentioned in the bill.

THE VICE PRESIDENT. Well, I would say the President is. That doesn't necessarily mean everybody in the White House is.

MR. MOSHER. I know that.

THE VICE PRESIDENT. Excuse me for making the distinction.

Later in the question period, Symington, referring also to the May 22 meeting he had attended, again brought up the issue of Senate confirmation:

MR. SYMINGTON. I am just wondering if you think the President might be allowed to have his way in this respect?

THE VICE PRESIDENT. That is an interesting question. You were there and heard him express himself on the subject, and I think he understands probably better than most in the White House the importance of the relationship between the Congress and the Executive and that really we can only do an effective job for this country if we develop policies together and stick together and carry them out together.

Nine additional members had a chance to pop brief questions. Jarman asked about a cabinet-level Secretary of Research and Technology Operations, as included in the Teague-Mosher bill. The Vice President was generally negative, but courteous, as he was to McCormack who made an impassioned plea with beaucoup illustrations as to why it was the best and only solution. Wylder for the first time

announced his support for the concept. He explained his prior reservations:

I am one of those who, although somewhat persuaded by the arguments that we have heard before this committee on the need for a special adviser to the President on science, always felt if he didn't want it, I wasn't going to try to make him have it

THE PROSPECTS FOR LEGISLATION IN 1975

Despite the resounding dramatic success of the committee's use of the Vice President's visit as a sounding board, Teague was not optimistic about getting legislation on the statute books in 1975. He was not even sure the committee could beat the clock sufficiently to get a bill through the House before the end of the year. The committee in five days of June hearings plunged ahead to analyze the Teague-Mosher bill, the administration bill and to vacuum up advice from many other sources.

Once again, the staff outdid itself in providing a voluminous collection of information and advice, not only for the committee members, but also for the information of the public and scholars everywhere. To begin with, there was a tightly organized 61-page report on the Teague-Mosher bill and its background and rationale. Each committee member was provided with a nine-part handbook, covering the hearing schedule and witnesses, the full background of the Teague-Mosher and administration bills, cost estimates, description of Federal agencies involved, the full rationale of the Teague-Mosher bill, a series of pros and cons of various sections of the bill, and a host of suggested questions for the witnesses, plus a comparison of the Teague-Mosher bill with S. 32—the Senate version. The entire handbook, which the committee eventually had printed in the back of the 1975 hearings, covered 78 printed pages. By the time the 1975 hearings and the many appendices had been printed, they constituted 1,041 pages of rich ore for anyone who cared to mine it.

In opening the hearings, Teague outlined some of the contrasts between the Teague-Mosher bill and the administration bill. He remarked that the committee bill included a "number of controversial aspects," adding:

We have tried not to duck anything, and there is a reason for everything in the bill.

Once again, he stressed that "it is not, however, cast in concrete." Teague proved by his subsequent actions that he was completely flexible in his approach, with no undue pride of authorship for ideas which had been forged over the years.

DR. STEVER LEADS OFF

Opening the formal hearings after the Vice President's appearance was Dr. Stever, who devoted his argument to explanation and support of the administration bill. He was followed on June 11 by another strong pitch by McCormack on behalf of a cabinet department with the acronym STEAM (Department of Science, Technology, Energy and Materials). McCormack received some high compliments for his proposal, but Wydler responded with an adroit combination of parliamentary courtesy and severe analysis:

Mike, you have a very good idea here but—with all due respect to you and the friendship I have for you—I would advise you to forget it. * * * This is said with all real kindness, because the idea has great merit. I can see that. As a practical matter, I suppose what I am saying is, I think it will be an exercise in futility.

Those testifying in the June 1975 hearings were not all optimistic about getting a consensus and passing legislation very soon. Mosher asked Dr. David:

As a matter of strategy, do you think by statute this should be made effective as of 1977 rather than immediately, considering where we are?

Dr. David pessimistically replied:

I think it would be a wise move. I suspect, however, that, given the natural pace of the legislative machinery, including the inevitable conflicts and scheduling difficulties, that the coming legislative effort will not become effective until that date in any case.

Teague was not about to accept the "natural pace of the legislative machinery" if that meant inordinate delay. But he now faced a serious dilemma. He appreciated the fact that a bill as comprehensive as the Teague-Mosher bill would not be accepted by the administration. Yeager realized this too, but also cautioned that now was not the time to toss overboard the accumulated wisdom of a decade of insight by the committee. Teague agreed that these issues must not be sacrificed on the altar of appeasement. Two other factors complicated the picture at the conclusion of the 1975 hearing in June: The comprehensive Senate bill was ever present like Banquo's ghost; and there was a power struggle going on within the White House and executive branch itself over the constitutional and political issues of precisely how much power could or should be delegated by the President to the new advisory apparatus.

So what do you do when events and rumors are swirling around? Analyze, that's what. Following its usual pattern, the committee staff, with the stalwart assistance of the Science Policy Research Division, bravely tackled the June 1975 hearing record. Mrs. Dorothy M. Bates produced an analysis by title and by witness which showed that there

was support for the statement of science policy which the Teague-Mosher bill had included in title I, but there was opposition to the Cabinet Department of Research and Technology Operations. There was also opposition to one feature of the bill which had recommended establishment of an information corporation.

DRAFTING A NEW TEAGUE-MOSHER BILL

Concurrent with Mrs. Bates' analysis, which was completed on June 22, the staff drafting team was frantically redrafting a new bill to take the place of the original Teague-Mosher version. All this was going on while almost nonstop meetings, conferences and phone calls were taking place and involving the White House (particularly Cannon and the Vice President's office), the scientific community, and numerous other interested parties. Daddario was a frequent and unannounced visitor. Franklin P. Huddle of CRS was around so much he seemed like a regular staff member. The Legislative Counsel's Office had more than its customary share of deadline demands to meet.

One striking feature of all these negotiations was that most members of the full committee were not enlisted in the process. One of the arguments for handling the bill in the full committee was that all members could then participate. Yet none of the analyses of the hearings held in 1973, 1974, or 1975 included any mention of questions or suggestions by any member of the full committee. Other than the principals and a few last-minute efforts by McCormack and Brown, there was little effort to enlist other committee members in developing the necessary consensus or entertaining new ideas and approaches. Members were repeatedly told that staff members stood ready to supply any information needed in response to questions, and once the September version of the bill was drafted in 1975 there were briefings for both members and their staff. Yet the feeling pervaded that most decisions had to be closely held until shared later when they were more frozen.

THE JULY 30 REVISED BILL

The decision on a July 30 bill was certainly of this character. A new version of the Teague-Mosher bill, radically different from the earlier one, was dropped into the hopper on July 30, 1975. Although the new bill retained the old title I on science policy, the administration recommendation of an Office of Science and Technology Policy was incorporated—and survived the rest of the tortuous legislative process. Also included was the Rockefeller plan for a Director and up to four Assistant Directors, but the functions were spelled out in greater detail than in the administration bill. The sections of the original

Teague-Mosher bill which had called for a Cabinet Department of Research and Technology Operations and the information corporation were ditched. In their place was established a Federal Science and Technology Survey Committee to study and report on all the unresolved questions of science policy and organization which had been brought to the surface.

As he introduced the bill, Teague told the House on July 30 that he felt the committee had achieved "a reasonable compromise which is both effective and possible." He termed the new bill one which contained "the most promising features" of the original bill and the administration bill. He especially noted that he felt it important to include those features of his original bill "which both the Congress and the President would be likely to find feasible and beneficial."

Recognizing that the new bill had not yet cleared the full committee, Teague told the House that he hoped the committee would report a new bill in September. Noting that the Senate was also ready to act, Teague then made this optimistic prediction:

We look for a bill compatible to all parties to become law before the end of this year.

NEGOTIATIONS WITH THE WHITE HOUSE

Unknown to all but his closest friends and staff, Teague had suffered a mild stroke in the summer of 1975. Although he was forced to curtail his activities, the staff redoubled its efforts to arrive at an agreement with the administration. A negotiating group for the administration included representatives of the Domestic Council, the National Security Council, OMB, and Dr. Stever's office in NSF which had been acting as the Science Adviser since 1973. There were many tough and detailed fights over specific language and its interpretation, but general agreement was reached in support of the structure of the July 30 Teague-Mosher version. The administration agreed to Senate confirmation for the Director, but not for the four Assistant Directors. There were other changes insisted on by the administration negotiating team, in the direction of giving the President more control, and authorizing the Office of Science and Technology Policy to do less.

Teague and Mosher gave their tentative approval to the revisions in their July 30 version, and had a printed revision made incorporating these changes by September 16. The committee staff then started a serious effort to brief all members of the committee and the individual Members' staffs on the current status of the bill. One Member surprised the committee staff by walking in on the special briefings arranged for individual Members' staffs. The staff had available a huge four-column chart which contrasted, in parallel, the original

administration bill, the July 30 Teague-Mosher bill, the September 16 Teague-Mosher compromise, and explanatory notes which furnished the rationale for the changes.

MCCORMACK AND BROWN RESERVATIONS

Two members had serious objections to the September 16 compromise: McCormack and Brown. They were influential members who could not be ignored. Ranked fourth and fifth in seniority on the Science Subcommittee, and eighth and ninth on the full committee, they also had developed a following and prestige which made their suggestions take on even greater significance. Perhaps a calculated risk had been made in excluding them from the negotiations with the White House, but then it was also a risk to upset the balance of these delicate negotiations by allowing members to ride their particular hobbyhorses.

Substantively, Brown was very much disturbed that the language on long-range planning of science policy, included in the March version of the Teague-Mosher bill, had been dropped in the July 30 version. While the negotiations were still going on with the White House, Brown wrote Teague a four-page letter on August 29, urging him to reinstate the provisions for long-range, strategic policy planning which had been dropped from title I. Brown argued that codification of planning requirements "would increase the effectiveness of our oversight efforts" and "will provide a framework for our judgment of individual programs." He buttressed his argument with extensive quotations from the National Academy of Sciences and American Association for the Advancement of Science recommendations. The September 16 revision of the bill did not meet Brown's objections, so he wrote again to Teague on September 29, furnishing language of an amendment he said he would offer when the full committee met to mark up the bill. Brown reiterated that a long-range policy planning report would give the committee a yardstick to apply in its oversight and budgetary reviews. The staff immediately went to work in an attempt to draft a compromise amendment which would meet the objections of the administration. The White House would not accept the Brown approach because they felt it was too burdensome.

McCormack had a number of discussions with Teague about the bill. He became resigned to the fact that under the circumstances he could not persuade the committee to retain a Cabinet department in the bill. Yet he felt the committee was caving in to the administration too fast in failing to provide for at least a study of a Cabinet department which would furnish an option to the next President. On

September 18, McCormack wrote Teague his objections, opening with a phrase which overlooked Teague's central role in the process:

As you recall from our recent discussions, I have several reservations concerning the legislation prepared for you. * * * I am troubled by the *limited* scope of studies ordered by the bill. * * * I do have reservations about the general tone of the bill, which seems to be directed more at the limited concept of an Office of Science and Technology than at the broad spectrum of options that I think should be made available in an orderly fashion.

A compromise was worked out with McCormack. Instead of requiring the Office of Science and Technology Policy to make a report on the new Cabinet department of STEAM, the study was written in as one of the options on which the survey committee was to report.

Although Brown's amendment sounded good on the surface, it was adamantly opposed by the administration. An attempt was made by the committee staff to draft compromise language. But by the time the full committee was ready for its markup session, Brown had seen, but did not accept, the suggested compromise. These negotiations provided an interesting switch in the attitudes of two committee members: McCormack, who had the reputation of a hard-nosed ideologue who stood up and fought to the bitter end for what he believed in, had agreed to an acceptable compromise; on the other hand, Brown, who generally avoided fights he knew he could not win and usually looked for achieving goals through constructive compromise, was holding out for language beyond the point it could be accepted by the White House.

FULL COMMITTEE MARKUP MEETING

After several delays, Teague called a meeting of the full committee for October 9 to mark up the bill. He arranged in advance of the meeting to be dealt one trump card to drop face up on the table: A letter from President Ford endorsing the September 16 version of the Teague-Mosher bill. The letter arrived just in the nick of time, and was dated October 8—the day before the meeting. Teague did not read the entire letter, perhaps because of the first sentence which stated:

Thank you for the prompt attention you have given to my proposal for creating an Office of Science and Technology Policy in the Executive Office of the President.

After many years of work which had been put in by the committee on the subject, and after exerting considerable pressure in the spring of 1975 for the White House to move, perhaps the least the President could have said was that this was truly a joint proposal. But Teague did not take offense. He realized that occasionally Congressmen also pick up other people's bills and send out press releases contending

that the idea first occurred to the person whose name was on the press release.

A few minutes after the hearing had opened on October 9, Wydler said he understood Teague had the President's "approval or concurrence with the bill as it now stands." Mosher responded:

Mr. Teague and I have personal letters from the White House and his personal assurances that he very much approves the piece of legislation before us.

Teague then quoted the second paragraph in President Ford's letter:

Members of my staff and I have reviewed the September 16th version of the substitute bill, H.R. 9058, developed by you and Congressman Mosher. This bill, while somewhat different from the one I submitted on June 6, is acceptable and I will support it if your committee and the full House approve it essentially as it now stands. I also want to thank you and Congressman Mosher for your leadership on this matter and for the cooperative manner in which our staffs have been able to work on the bill.

Teague was his usual blunt self when he presented the bill to the full committee:

For those of you that don't know this, this bill has been kicked around in this committee for three years. This has been between the executive branch and the committee. It contains almost the same language as what the White House wants. We worked very closely with them and the whole scientific community. We have a bill that is satisfactory to them, provided there are no major changes. I hope we can pass this bill as is. This would give us a basis to work from. Next year, if we need to change it, we will have hearings and take up any changes anybody wants to make.

Mosher labeled the legislation "the product of the initiatives from this committee" plus the request from President Ford. He added:

I think we have developed a piece of legislation that is extremely important to the Nation and to the whole science and technology community. I agree with you, that it would be best if we used restraint in our processing of, and the development of, this bill. I hope we can maintain it largely as it comes to us.

When the committee met on October 9, the members were in a compromising mood. McCormack announced:

In deference to the leadership of the committee, I have agreed to this modest approach, simply to request the committee that is created to include this concept in its overall studies.

Although Brown agreed merely to mention "long-range planning" in the bill, he insisted on including extensive "Additional Views" at the back of the committee report. In his separate views, Brown again argued strongly that more stress on long-range planning should be placed in the bill. He incorporated the arguments he had previously made, plus the language of the Academy of Sciences and AAAS recommendations. With these minor variations, the bill was unanimously reported by the full committee on October 9.

THE HOUSE RATIFIES COMMITTEE DECISIONS

The Ford letter not only helped solidify Republican backing in the committee, but also was instrumental in lining up support in both the Rules Committee and on the House floor. Many of the Members, for example, did not seem to be as interested in the content of the bill as the issue of whether or not the President supported it. And Democrats generally might have decided that passing a bill which the President did not want to use would be simply a futile gesture of political defiance.

The committee had no difficulty obtaining a resolution for one hour of debate from the Committee on Rules. The bill was then debated on the House floor on November 6, 1975. Ordinarily, the public might conclude that debate by the entire House of Representatives would bring into focus all the mighty pressures for and against a major piece of legislation, with a stenographic public record and rolcall on how everybody stands. Such may be the case at times. With respect to the bill in question, the House debate was clearly an anticlimax. The skids had been well greased in advance, and all opposition had evaporated. Nobody spoke against the bill during the general debate, nor were any questions asked during the amending process. To be sure, 28 Members of varying political persuasions were recorded against the bill on final passage, but none of them took the trouble to explain why. Two amendments were offered, and quickly adopted. Fuqua, who also served on the Government Operations Committee, presented an amendment to remove a section of the bill which affected the jurisdiction of the Government Operations Committee over reorganization plans. Another amendment was sponsored by the Post Office and Civil Service Committee, to clean up language on the power of the Director of the Office of Science and Technology Policy to appoint and fix compensation of certain employees.

The debate was desultory, and very few Members remained on the floor. The time was devoted primarily to placing material into the Record to explain the bill. This was done by Teague, Mosher, Frey, Fuqua, Winn, Emery, Myers, Hechler, Symington, Bell, and Wirth. Bell was so enthusiastic that he had two different sets of remarks inserted in support of the bill. In those days, one clue as to whether a Member actually delivered his remarks on the House floor sometimes was contained in the permission granted to "revise and extend remarks," especially when the floor manager yields "such time as the gentleman may consume" rather than a specific number of minutes. The more modern custom of placing bullets in front of remarks not actually delivered personally, but merely inserted into the Congressional Record, was not in effect in 1975. For example,

while Hechler was speaking, Majority Leader O'Neill asked him to yield. The Congressional Record would indicate that O'Neill delivered an eloquent encomium to "'Tiger' Teague and Charlie Mosher," who had met with the President and worked out the details of the legislation. According to the Record, O'Neill said, "'Tiger' and Charlie have grasped the meaning of an interrelated world." If the truth be known, the staff made elaborate advance preparations to insure that these staff-prepared remarks were given to O'Neill in advance of the debate and even though they were not actually spoken, they appeared as part of the debate. The committee staff was very busy preparing sheafs of "suggested remarks" which subsequently appeared verbatim in the Record, although certainly neither Teague nor Mosher knew in advance what had been furnished to the majority leader to deliver.

But there was one completely unrehearsed and extemporaneous statement which Mosher made on November 6, which required no staff assistance or advance prompting:

I want to express my personal appreciation and gratitude to Phil Yeager, of our committee staff, for the very diligent, responsible, creative role he has played as the one person most active in conceiving and perfecting this legislation. It is typical of the extremely significant, fruitful service he has given for these many years to our committee and to the Congress as a whole, and I hope he will continue to give for a long time to come. I know that Chairman Teague and other committee members join me in this expression of our admiration and respect for Phil.

By a rollcall vote of 362 to 28, the bill passed the House on November 6. The big hurdle of reaching agreement with the White House had temporarily been surmounted; now the issue was how to reach agreement with the Senate and still retain the acceptance of the White House for the legislation. The road ahead was a rocky one.

NEGOTIATING WITH THREE SENATE COMMITTEES

The prospects for agreement with the Senate were clouded by the fact that three Senate committees had their fingers in the pie: Senator Kennedy's National Science Foundation Subcommittee of the Labor and Public Welfare Committee; Senator Magnuson's Commerce Committee; and the Aeronautical and Space Sciences Committee headed by Senator Moss. Furthermore, S. 32 had a long tradition in the Senate of including many provisions which clearly represented Senate policy, but which were strange to the thinking of both the House of Representatives and the White House. Also, the Senate staff negotiators had been through several tough battles with the House on the OTA bill, and conference reports on various issues. The House Members and staff knew the Senate staffers had very

strong points of view for which they managed to get powerful backing from the Senators they represented.

On December 3, 1975, Vice President Rockefeller wrote a letter to Senator Kennedy which included this sentence: "I urge you to move for prompt Senate approval of the House bill." Senator Kennedy responded on December 8 that "there are a number of areas in which the House bill should be strengthened," and "it is in the national interest that we attempt to improve the legislation in the Senate." During December, there was a great deal of confusion as the administration began to realize that there was a whole new ball game. Various members of the scientific community helped stir things up by blaming numerous parties to the struggle for holding things up. Although it was extremely difficult to separate rumor from fact, it is evident that the White House hoped to salvage an acceptable bill by creating a coalition of Republican Senate Members plus the backers of the House-passed version, and then win by driving a wedge into the three Senate committees.

THE BILL PASSES THE SENATE

By February 5, 1976, when the bill had cleared the three Senate committees, many of the extraneous provisions in the old S. 32 had been dropped—such as the power of OSTP to decide spending levels for science and technology. That same day the Senate passed the House bill after amending it to include the text of S. 32 as reported. But there were still storm signals ahead. It is interesting that during this period the House staff of a Democratically led House seemed closer to the Republican led White House in a Presidential election year, at that—than to the Democratically led Senate. The basic cleavage between the House and Senate turned on the House conviction that the President should have wide authority to determine how the White House science machinery should be fashioned, as against the firm feeling of Senator Kennedy that the Congress was writing legislation not for President Ford but for all Presidents and it must stand for the long future.

On February 10, Yeager prepared a crisp, two-page analysis of the major differences between the House and Senate bills, along with recommendations for Teague to consider on strategy to be followed during negotiations with the Senate. The memorandum contained items such as this:

Title I: There are 6 or 7 clauses in the Senate Statement of Policy about which they feel strongly and which are not contained in the House version.

Comment.—We should have no trouble incorporating these into the House version of Title I.

There were other items discussed in the February 10 memorandum on which it was suggested that the House stand firm. The memoran-

dum proved to be a fairly good prediction of how the Senate would react, and what the compromises would eventually be. Yeager was given authority by Teague to proceed to negotiate with the Senate staff along the lines of the February 10 strategy memorandum. Teague urged that as many as possible of the differences be negotiated by the staffs in advance of a formal conference.

After additional strategy sessions, on February 25 the House disagreed formally with the Senate-passed bill and asked for a conference. At this point, Teague, although a longtime defender of the seniority system, stepped in and exerted his prerogative as committee chairman to reach down into the committee and name the people he wanted as House conferees. Although the bill had been heard and considered throughout in the full committee, several members were skipped over in order to obtain the conferees who were wanted. In addition to himself, Teague named Fuqua, Symington, McCormack, and Thornton as the Democratic conferees, and Mosher and Esch as the Republican conferees. At first glance, it might be concluded that Teague was simply going down the seniority list on the Subcommittee on Science, Research and Technology. But even if this were true, Flowers and Brown were senior to McCormack and Thornton, respectively, on the Science Subcommittee. Suffice it to say, the delicate negotiations with the Senate, like the negotiations with the White House, were carried on within a tight circle of informed committee members. Although the chairman and staff were always open in their responses to questions, very little was volunteered and certainly not cleared with senior members of the committee.

The month of March was occupied with long, complex, and at times highly emotional negotiating sessions between the staffs of the House and Senate. Frequently, Yeager and Wells, the two House negotiators, were faced with upwards of 20 Senate staff members from the three different Senate committees. Wells indicated that he and Yeager "often remained silent while the Senate staff argued among themselves." He added that often Yeager "was a calming influence when tension ran high."

PRESIDENT FORD PRODS CONGRESS

Having been prodded by Congress to move in 1975, President Ford as a candidate for election in 1976 perhaps felt it was time to turn the tables and give Congress a prod about "his" proposal. On March 22, 1976, the President sent a message to Congress which included this sentence:

Early agreement by the conference on a workable bill will permit me to proceed without further delay in establishing the Office of Science and Technology Policy.

By the time the President's message had arrived, the staffs of the House and Senate were moving closer toward agreement. The House had yielded to the Senate's desire to breathe new life into a Federal Coordinating Council. Some objectionable Senate provisions had been carefully changed through phraseology to become acceptable—such as labeling a 5-year forecast as an "outlook." One very unexpected issue ballooned into a heated controversy, when the Senate added the word "engineering" in the title and throughout the bill to the dismay of the House negotiators, who looked on engineering as encompassed by science and technology. Just when they thought they had a compromise worked out, a well-orchestrated campaign was mounted by engineering societies all over the country, and the whole issue was thrown back to be considered when the conference committee met on April 1.

THE CONFERENCE MEETS ON APRIL 1

At 8:40 a.m., the joint conference met in room 235 of the Russell Senate Office Building. There were five House and five Senate Members present, as follows:

House: Teague, Fuqua, Symington, Thornton, and Mosher.

Senate: Wendell H. Ford (Democrat of Kentucky); Barry Goldwater (Republican of Arizona); Edward M. Kennedy (Democrat of Massachusetts); Paul D. Laxalt (Republican of Nevada); and Frank E. Moss (Democrat of Utah).

According to custom, the conference opened on a friendly and humorous note, as follows:

Senator KENNEDY. Could I suggest that Chairman Teague be Chairman of the Conference? If there is no objection, that will be a proposal to be put forward by our side, Mr. Chairman.

Senator MOSS. I do not hear any objection.

Mr. TEAGUE. Thank you, Senator. I understand there has been some kind of frame-up on this.

Senator KENNEDY. You win it every time.

TEAGUE CALLS ON NOAH WEBSTER

Teague immediately brought up one of the most ticklish points, the use of the word "engineering" in the title and throughout the bill, which individual Senate conferees strongly defended. Teague offered Webster's definition of engineering, science, and technology, as follows:

Engineering: A science by which the properties of matter and the source of energy and nature are made useful to man.

Science: A possession of knowledge, as distinguished from ignorance and misunderstanding; knowledge obtained through study or practice.

Technology: Applied science; a technical method of achieving a practical purpose.

Teague then added:

We met yesterday and talked about this at length—that if you are going to put “engineering” in, we should put in a number of other things. Our group voted, I do not believe unanimously, almost unanimously.

Mr. FRUCA. I was outvoted, Mr. Chairman.

Mr. TEAGUE [continuing]. Not to include the word “engineering”.

After some minutes of fruitless argument, the subject was deferred. A later staff compromise omitted engineering from the actual title of the bill, but liberally sprinkled it throughout the text of the bill.

Another sticking point in the conference was the State and regional science and technology program placed in the bill by the Senate, which the House wanted to drop. Just as the engineers had a well-organized campaign for “engineering,” so did the State and local organizations flood the conferees with last-minute pressure. The Senate fought hard for its version. Turning to Teague, a deadpan Senator Kennedy intoned: “We do not think all knowledge is here in Washington.” Teague responded: “That is one thing our side will agree with you on.”

SUBSIDIES TO STATES

After some laughter, the debate proceeded along somewhat more acrimonious lines. Senator Ford cited the support of the National Governors’ Conference, the U.S. Conference of Mayors, the Federation of Rocky Mountain States, and many other organizations. Mosher touched off a violent reaction by Senator Ford when he suggested:

Somehow, to me, it seems that this is excess baggage in this bill. * * *

Ford, his eyes blazing, snapped:

The term “excess baggage” I do not think would be appreciated by those states who are very strongly interested in this piece of legislation. I might tell my colleagues that I am only 15 months away from being governor. * * * And I have a hard time restraining my emotion when I hear, when you want to call states “excess baggage.” I do not take exception to the Congressman, only in his language and terminology.

Teague weighed into the argument from the chair:

From the time I have been around this place, the science and technology in the White House has been utter confusion. And President Nixon fired his science adviser, and we worked on this damn bill for I do not know how long, and we finally got something worked up that they will agree to. And I do not—and I think what Charlie was saying, he certainly was not downgrading the states. But this is not the place to do this. The National Science Foundation, yes; and I will support in every way, form or fashion whatever you want to put in there in this way. There is no question it is a good idea and a good point. But it is not in this bill. In the first place, a point of order will be made against it.

The issue of funding State efforts in science and technology, which was already being undertaken by the National Science Foundation, was finally resolved by a compromise partially suggested by Symington, who promised to beef up the intergovernmental program in the NSF

authorization bill. A suggestion by Senator Moss was also adopted as a compromise in the final legislation which established the Inter-governmental Science, Engineering and Technology Advisory Panel.



President Gerald R. Ford signs the National Science and Technology Policy, Organization and Priorities Act of 1976 in a ceremony in the East Garden of the White House. Standing behind the President are Vice President Nelson A. Rockefeller, Senator Frank E. Moss (Democrat of Utah), Representative Olin E. Teague (Democrat of Texas), and Representative Charles A. Mosher (Republican of Ohio).



A view of the crowd in the White House East Garden at the bill-signing on May 11, 1976. Representative Larry Winn, Jr. (Republican of Kansas) is seated in second row.

HOUSE ADOPTS CONFERENCE REPORT

Following another series of crisis negotiating sessions between the staffs, the conference report was ready to be presented to the House and Senate after the Easter recess. Teague brought up the report on April 29 in the House, after it had already cleared the Senate. Representative Robert E. Bauman (Republican of Maryland) asked a number of critical questions about why the National Science Foundation could not continue to provide science advice to the President, instead of creating a new office. Teague, Mosher, Frey, Fuqua, Brown, and McCormack all spoke out in favor of the new advisory structure which had received strong bipartisan support throughout the long and difficult negotiations. While enthusiastically supporting the final product, Brown again stressed the need for greater long-term planning; he repeated his view that "failure by the Federal Government in these areas could comprise its Achilles' heel." McCormack, in supporting the conference report, mentioned that in the bill the survey committee had been empowered to study the possibility of a Cabinet-level department for fuels, energy, and materials. He predicted that the recommendations coming out of the survey "and what Congress does with them two years hence could well be one of the most important legislative events of our time."

PRESIDENT SIGNS THE BILL ON MAY 11

It was a gala celebration ceremony in the East Garden of the White House on the balmy spring day of May 11, 1976. About 200 guests attended, including former Presidential science advisers, members of the scientific community, and those who had worked hard for the bill. A large delegation of committee members was in attendance. The audience sat in folding chairs in front of the President, who signed the bill at a table on the lawn. Standing immediately behind the President were Vice President Rockefeller, Senator Moss, Teague, and Mosher. When the President signed the bill, Mosher was nearest to him, so President Ford presented him with the first pen. Instead of keeping the pen himself, Mosher gave it to Phil Yeager with a note indicating that he was the person who really deserved that pen. In his remarks at the ceremony, the President stated:

I congratulate and thank the Members of Congress on the fine work represented by this legislation. It is a good example of an effective cooperation between the Congress and the executive branch, and I am most grateful.

The culmination of many years of effort was a proud moment for the committee. It represented a significant triumph for the committee strategy used in patiently forging a structure which was so important for the future of science and technology coordination, and leadership at the highest level.

POLITICAL BRAWL OVER APPOINTMENT OF DR. STEVER

Once the bill was signed, you would have thought the committee could put the issue on the shelf. Not so. A major political brawl developed over President Ford's selection of a Director for the Office of Science and Technology Policy. Dr. Stever was a natural for the post. But the air was soon rent with cries from four U.S. Senators that as Director of the National Science Foundation Dr. Stever had mismanaged public funds by supporting programs like MACOS (see chapter XII for an account of the MACOS controversy). The four Republican Senators—Jesse A. Helms of North Carolina, Carl T. Curtis of Nebraska, Clifford P. Hansen of Wyoming, and James A. McClure of Idaho—wrote a stinging letter to the President on June 9, contending it would be "an affront to the Congress for Dr. Stever to be appointed to another high position before this bad NSF situation had been completely investigated, and the full extent of official involvement is known." The letter also attacked Symington in the House and Kennedy in the Senate for their handling of the MACOS and other NSF issues.

This was too much for Teague. Despite the fact that he personally had been disturbed by the MACOS program and had spoken out against it in the committee, he deeply resented what he regarded as a hit-and-run attack on Dr. Stever and one of his subcommittee chairmen. Mosher was equally upset by the attack and wrote to the four Senators on June 11, saying he was "startled and disappointed" by their letter, adding:

I have read and reread your letter to the President very carefully, and I cannot help but believe that you and your colleagues are being used most unfortunately for propagandistic purposes. As one who has been completely involved in the lengthy and complex situation at the National Science Foundation, to which your letter alludes, I must say it seems to me your letter to the President gives a very distorted picture of that situation. I cannot help but believe that you accepted very inadequate, selective and distorted information as the basis for the judgments you expressed.* * *

Mosher also defended Symington against the charges made by the four Senators.

Teague responded on June 17:

Based on its inaccurate content, the letter you and three of your Senate colleagues sent to the President on June 9 is an affront to me and to the Committee on Science and Technology. Apparently you sent the letter with no attempt to ascertain the facts from anyone in a position of authority on our committee. I conclude that you were either misled or that you were not interested in the truth about a very complicated situation.

In the last paragraph of your letter you make charges against Mr. Symington and the work of this committee which are untrue. Any fair-minded review of the oversight record of this committee will show that broad, vigorous examination of the National Science Foundation has been one of our highest priorities for more than four years and especially the past eighteen months. * * *

The attacks on Dr. Stever came at a critical time when Ford and Ronald Reagan were locked in a tight struggle for the Republican Presidential nomination. Dr. Stever attempted to withdraw his name, but after some delay President Ford announced on July 21 his intention to nominate him. The Senate quickly confirmed Dr. Stever and he was sworn in on August 12, 1976.

The day before the President's announcement—July 20—Dr. Stever appeared before Thornton's DISPA Subcommittee which was holding special oversight hearings on interagency coordination of Federal scientific R. & D. "Dr. Stever, you come wearing many hats, as you often do to our committee," Thornton said in welcoming him. Without hesitation, Dr. Stever responded:

As you are aware, we are in a phase of transition and I'm not sure I am wearing any hat.

The committee watched with paternal interest and enthusiasm as Dr. Stever, fully supported by President Ford, moved quickly to implement the 1976 act in the brief period of his service from August 1976 until his resignation at the end of the Ford administration on January 20, 1977.



Dr. Frank Press, President Carter's Director of the Office of Science and Technology Policy, confers with the President in the Oval Office.

PRESIDENT CARTER AND THE 1976 ACT

Some members of the committee were apprehensive that President Carter's campaign against the Washington establishment would spill over into a downgrading of the scientific machinery so laboriously put together in the 1976 act. Subsequent events showed there was some reason for such apprehension. But there was general praise for President Carter's selection of Dr. Frank Press, chairman of the Department of Earth and Planetary Sciences at MIT, as the new OSTP Director and the President's Science Adviser. Teague circulated background information on Dr. Press to all committee members in March. Fuqua, Thornton, Wydler, and Hollenbeck invited Dr. Press to meet with them in Fuqua's office on the afternoon of April 5—two days before he appeared for confirmation hearings in the Senate. At the meeting, Dr. Press was interested to discover that the committee members knew far more about the dimensions of his job than he did, as a result of the years of hard work on the legislation establishing his office.

At the end of April, the OMB sent a form letter with a duplicated signature to Teague indicating that a reorganization plan covering the Executive Office of the President would be sent to the Congress in June. Responding to the invitation for comments, Teague on May 16 stated:

I would like to comment, in particular, on the importance of the Office of Science and Technology Policy (OSTP), and I strongly urge that it be retained in substantially its present role and structure.

Teague especially urged that the reorganization plan should insure "maintenance of the OSTP as a source of science policy development and application at the highest level of Government." He also stressed "the importance of the science and technology survey included in title III of the act." This title provided for a temporary President's Committee on Science and Technology of 8 to 14 Presidentially appointed members who would survey and report on the overall Federal science, engineering, and technology effort, with an interim report in 12 months and a final report within two years.

PRESIDENT CARTER'S REORGANIZATION PLAN

In spite of the fact that Dr. Press was sworn into office on June 1, there remained a great deal of uncertainty concerning the management of science policy. The questions were not fully answered when President Carter sent his reorganization plan to the Congress on July 15. The plan retained OSTP, but radically changed some of the requirements in the 1976 act. Teague felt the effect of the plan was important enough for

him to submit testimony to a House Government Operations subcommittee on August 3. In his prepared statement, he pointed out that the plan changed the 1976 act by transferring the annual and five-year outlook reports to the National Science Foundation. He also noted the reorganization made other changes in statutory requirements by abolishing certain specifically established committees and coordinating councils and transferring their functions to the President for later redelegation. Teague told the House subcommittee:

Frankly, I find it impossible to tell, from all that the White House has provided so far, whether or not statutory functions mandated in P.L. 94-282 [the 1976 Act] have in fact been abolished. Every one of the modifications made to that law by the Reorganization Plan is vague and uncertain. The device of transferring statutory functions to the President for later redelegation is particularly unfortunate because it gives the Congress no idea of their final disposition.

OMB Director Bert Lance tried to calm Teague's fears with a more detailed explanation of the reorganization in a letter of August 26. Lance in effect contended that the work could be done more efficiently in places and through means different than those stipulated by Congress. Teague would not buy this explanation. He again expressed his disagreements in a letter to the new OMB Director, James T. McIntyre, Jr., on September 27. Teague especially underlined the fact that the reports, as well as the two-year survey, could hardly be done according to the intent of Congress if they were piecemealed out to subordinate, scattered groups. Teague told McIntyre:

Let me observe initially that the feeling expressed informally to us that the preparation of these reports could become a burden to the small staff of the OSTP is disappointing to us. We look on these reports as important and necessary additions to the process of formulating the Nation's science and technology policy. We would hope that their preparation would be looked on as a challenge, involving a broad-gauged approach to both current and longer term policy issues in this field and involving some of the best minds of the country.

Teague also stressed that the reports and the survey should genuinely represent Presidential policy, which could hardly be done by contracting out the work to private groups or by stapling together miscellaneous papers fashioned by lower level bureaucrats.

Mosher, who had retired from the Congress at the end of 1976 and became the committee's executive director on September 1, 1977, echoed Teague's concern in an October 17 memorandum to all committee members. Based on a visit he made to Dr. Press with several other committee staff, Mosher informed committee members that it was "most disturbing" that the White House looked on the title III survey "not as a single, comprehensive, and integrated study, but as a group of 13 individual and separate studies. This clearly negates the value to the Congress (and probably also to the President and the

executive branch). It would mean that a major objective of the survey, the review of the relationship between individual aspects of the Federal science, engineering, and technology effort would not be studied and evaluated."

DIFFERENCES OVER INTERPRETATION OF THE 1976 ACT

The struggle between the committee and the White House over the interpretation of the 1976 act continued into 1978. Although the committee stopped short of charging that President Carter, like President Nixon, had actually dismantled OSTP, there was considerable unhappiness with the manner in which the White House was interpreting the breadth of OSTP's assignment. For example, Dr. Press told Mosher and his associates that the President's Committee on Science and Technology, responsible for the important two-year survey, should not be reestablished because it was the President's policy to do away with advisory committees. The OSTP staff was cut down from 32 to 22, but at least the organization survived. On the positive side, Mosher reported:

In general the impression created by the discussion at the meeting was that Dr. Press and his staff are well established in the White House. They are working with other Presidential staff and with the departments and agencies on a number of science policy issues, and they appear to have a good working relationship with OMB. This function of bringing science back into the White House was undoubtedly the major purpose of the Science Policy Act and Dr. Press appears to be off to a good start.

On February 24, 1978, President Carter issued an Executive order which confirmed the transfer of responsibility for preparing the two science policy reports to the National Science Foundation. He also reestablished the Federal Coordinating Council for Science, Engineering and Technology and the Intergovernmental Science, Engineering and Technology Advisory Panel—established by Congress in the 1976 Act, and abolished by the President in his 1977 reorganization plan. But the President's Committee on Science and Technology, which the 1976 Act stipulated should prepare a two-year survey, and which had been abolished under the reorganization plan, was not reestablished by the Executive order.

As the months went on, it was clear to the committee that the OSTP was a fully operating entity, and that Dr. Press as Science Adviser was generally performing the functions called for in the 1976 Act. Yet the committee was increasingly concerned that the title III survey and other independent evaluations were being ignored. During the summer of 1978, it was decided to schedule a full committee review in September which would cover the manner in which the 1976 act was being administered, the effects of the reorganization and Executive

order, and identify and discuss some principal evolving national issues as seen by leading science policy experts. It had been planned to invite former President Ford, Dr. Press, some of the President's science advisers of the past, as well as other outstanding members of the scientific community. However, Teague's illness forced the cancellation of the hearings. Instead, a two-volume compendium of papers was published.

The results of the long years of work by the committee had indeed paid off in providing the White House with the tools of leadership and coordination in the important area of science and technology. To the average Member of Congress, however, the issues raised in 1977 and 1978 as to whether the President was carrying out the intent of Congress, organization-wise, took a back seat to such problems as inflation, peace in the Middle East, and the future availability of energy. The couplet of Alexander Pope, while not directly applicable, represented a general reaction:

For forms of government let fools contest
Whate'er is best administered is best.

In 1979, Fuqua embarked on a new era of cooperation with the White House, Dr. Press and OSTP. Differences over interpretation of the 1976 act were minimized, and strong efforts were made to avoid procedural conflicts.

Yet the committee could take pride in having enacted a law which seemed destined to survive as a rallying point and statutory basis for reaffirming the importance of science and technology in the highest levels of Government.

Task Force and Subcommittee on Energy, 1971-74

When Mike McCormack was elected to the House of Representatives in 1970 from the apple-rich central third of the State of Washington, he immediately attracted attention as the only scientist to be serving in Congress at that time. His colleagues quickly learned that he had worked for 20 years as a research chemist at the Atomic Energy Commission's Hanford project. They also heard him say over and over again that "nuclear energy is the safest, cleanest, cheapest, most reliable source of energy available, with the least environmental impact of any significant option." Whether or not he was asked, he could quickly launch into an enthusiastic exposition of the virtues of the liquid metal fast breeder reactor.

Service in both branches of the Washington State Legislature for 14 years prior to his election to Congress in 1970 marked McCormack as a political leader with clear-cut goals, remarkable success in getting his own legislation enacted, and a fiercely competitive character. The *Almanac of American Politics* states: "Undisputed is the fact that his is an abrasive personality." Yet no committee member has ever risen as fast in authority and responsibility, and few others can point to as long a string of almost single-handed legislative achievements.

An avid reader, quick thinker, and restless achiever, McCormack has won his reputation in the field of energy. To some detractors, he could seem to be pompous, arrogant, irritating, and pedantic—qualities which his admirers would characterize as self-confident, determined, stimulating, and learned. Teague, who probably did more to short-circuit the seniority system and furnish McCormack with the weapons of power during his first two terms, once told a friend that McCormack had "too much nuclear and not enough Dale Carnegie."

With a degree in chemistry and a deep interest in basic research in the sciences, McCormack sought appointment in 1971 to the Science Committee. He was also assigned to the Public Works Committee, which helped him obtain the necessary projects to enable him to survive in a traditionally Republican district. He was a member of the Joint Committee on Atomic Energy until the time some of its functions were merged into the Science Committee in 1977.

During his first few months in Congress, McCormack decided fairly early that there might be other ways to get ahead than the prescription by Gilbert and Sullivan to "polish up the handle of the big front door." He had some fairly firm ideas on the need for the United States to build an aggressive program for greater production of energy. Along with Hechler, Fuqua, Davis, and several other committee members, early in 1971, McCormack took an interest in a resolution sponsored by Representative Richard H. Fulton (Democrat of Tennessee) to establish a select committee "to conduct a full and complete investigation of all aspects of the energy resources of the United States." The House Committee on Rules, in a surprise move, scheduled the Fulton resolution, H. Res. 155, for floor debate on May 26. McCormack pitched in not only to help mobilize support for the resolution but also put in a bid at the Speaker's office to be assigned to the new committee if it were created.

REPRESENTATIVE RICHARD H. FULTON SPONSORS ENERGY COMMITTEE

The bitter fight over the Fulton resolution was both instructive and to some extent disillusioning. Representative Chet Holifield (Democrat of California), one of McCormack's mentors in the area of nuclear energy, led the charge against the resolution because it invaded the jurisdiction of the Joint Committee on Atomic Energy. Other committee chairmen soon raised objections, and they were joined by Members from Interior, Interstate and Foreign Commerce, Judiciary, and others who felt their jurisdictions were being threatened. A sadly disappointed Fulton told Hechler on the floor that emotion and jurisdictional parochialism were going to win a big victory over logic. The Fulton resolution was soundly defeated, 218 to 128. Reflecting on the battle in 1978, McCormack remarked:

There would have been one comprehensive committee. In retrospect, it is a major tragedy for this country that legislation was not enacted.

The bitter fight over the Fulton select committee sparked McCormack to think through how Congress could get its energy act together without the knee-jerk jurisdictional opposition which had doomed Fulton's efforts. An idea began to take form: Why not get the Science Committee itself to create a group which could do some pioneer work on energy research and development without disturbing other committees? McCormack was at the time serving on the Subcommittee on Science, Research and Development chaired by Davis who had taken Daddario's place as head of that subcommittee. When he first came to Congress, McCormack had ambitions of attaining the status of Daddario, who had left at the end of 1970 after becoming recognized as "Mr. Science" in the House of Representatives. The energy R. & D.

idea gave promise of not only becoming more important within the Congress, but also furnishing an opportunity for McCormack to exert some early personal leadership.

THE TASK FORCE ON ENERGY

The combination of these two factors prompted McCormack to seek an early meeting with Davis. He found Davis to be very receptive to the idea of forming a group to tackle the energy issue. As a result of his experience with the hard jurisdictional fight over Fulton's select committee, McCormack came up with the concept of a "task force". Working under the umbrella of the Davis subcommittee, such a task force would not require any formal statute or resolution, thereby avoiding any open jurisdictional fights.

Davis suggested that they should enlist Teague's help, even though in 1971 Miller was the committee chairman. About that time, McCormack mentioned the idea to Dr. J. Thomas Ratchford, who was serving as staff to the Davis subcommittee. Dr. Ratchford expressed his great interest in the idea. When Miller was approached, he was generally negative toward doing anything as radical as McCormack proposed. At that stage, Miller was not eager to move fast or make any waves, and he reacted much the same way as he had when a Subcommittee on International Cooperation and a separate minority staff had been suggested: he was opposed, period. He did go along with McCormack's suggestion that a detailed written memorandum be prepared and forwarded to him on the subject.

How to overcome Miller's opposition? McCormack asked Teague and also the chairman of the House Public Works Committee on which he was serving, Representative John Blatnik (Democrat of Minnesota). They also favored spelling out the idea in concrete, written form, which McCormack did in a letter and memorandum to Miller, dated July 1, 1971.

A PROPOSAL TO CHAIRMAN MILLER

The letter in full read as follows:

DEAR MR. CHAIRMAN: You will recall that I recently discussed with you the possibility of the creation of a task force to study and report on the research and development requirements associated with future national energy needs. Such a task force would operate under the authority of the Subcommittee on Science, Research and Development.

I have followed your suggestion and prepared a work sheet to describe this proposal, and I have attached a copy of the work sheet to this note. I would appreciate your considering it at your leisure so that I may discuss it with you at your convenience in the near future.

As you are aware, I have discussed this matter with Congressman John Davis. I have also taken the liberty of discussing it with Congressman Olin Teague and Congressman John Blatnik, Chairman of the House Committee on Public Works, of which I am a member

Sincerely,

(s) Mike
MIKE McCORMACK,
Member of Congress

The five-page background memorandum reviewed the current energy picture, noting:

For a number of reasons, we now face an energy shortage. The growth of nuclear power has not been as rapid as expected, and environmental questions and high interest rates have combined to slow down the growth of plant capacity for generating energy. As a result, in the past few years we have seen "brown outs" and "black outs" in many areas of the United States.

McCormack listed the numerous committees having a piece of the energy picture: Government Operations, Joint Committee on Atomic Energy, Interior and Insular Affairs, Interstate and Foreign Commerce, Education and Labor, Ways and Means, and Select Committee on Small Business. He added:

With the exception of the Joint Committee on Atomic Energy and a Senate Interior Committee investigation into magnetohydrodynamics, almost all congressional activity has been on energy-related issues other than research and development. There does seem to be a lack of congressional activity in the energy R&D area, even though the President's Energy Message contained a great emphasis on the R&D aspects of the energy problem.

Under a heading of "Task Force Activities", McCormack indicated:

The proposed Task Force on Energy would investigate the research and development aspects of alternative methods of producing and transmitting energy. These would include:

- Controlled thermonuclear fusion.

- Various types of nuclear breeder reactors.

- Increased efficiency in conventional fossil fuel plants.

- Magnetohydrodynamics.

- Geothermal power.

- Solar power (utilizing both reflectors in space and solar cells on the ground).

- Tidal power.

- Energy conversion systems such as thermionics, thermoelectric, or similar systems.

- Fuel cells.

- Economical methods for the conversion of coal into gaseous and liquid fuels.

- Production of fuels from urban refuse.

- Commercially viable processes for the removal of sulfur oxides from stack gas emissions.

- Oil shale and heavy oil recovery.

- Methods for the reclamation of or safe storage or disposal of industrial liquid and solid wastes resulting from fuels and mineral processing.

Extremely high voltage transmission lines.

Cryogenics, including very cold and superconducting transmission lines and generators.

HOW THE TASK FORCE WOULD OPERATE

So far as the operation of the task force was concerned, and its relation to other agencies, McCormack stated in his memorandum:

The Task Force would attempt to determine those areas in which progress in research and development is particularly needed, and make recommendations to the Subcommittee on Science, Research and Development with regard to funding requirements and feasible development schedules.

The Task Force would cooperate with rather than duplicate existing studies underway in the House and the Senate and the Congressional Research Service, and would draw on their staff and expertise wherever possible with regard to the research and development aspects of energy. In case hearings are needed, and they probably will be, they would be held under the auspices of the Subcommittee on Science, Research and Development.

No attempt will be made to report specific legislation; rather the objective of the Task Force is to produce reports and communications which may include recommendations to a number of Congressional committees, including the Committee on Science and Astronautics, and various executive agencies.

There is a growing need for the research community, the executive branch, the Committee on Science and Astronautics and the Congress in general to understand what research and development is needed if the Nation is to cope with the impending energy crisis. This understanding should include not only estimates of the cost of the R&D, but a short and long range schedule of needed research and the interrelationships between the R&D being performed in various fields. The Task Force can provide a valuable contribution by helping to determine a rational set of priorities for energy research and development, and by demonstrating needs for funding specific R&D programs.

ENLISTING TEAGUE'S HELP

Now it was time to talk strategy with Teague and Davis: how to overcome the Miller road block? In more modern days, the way to do it would be to organize committee members, perhaps supported by outside groups, and challenge the chairman with a majority of the committee. Such an approach cannot be done every day, of course, but it could not be done at all back in the Miller years when the power of the committee chairman was virtually absolute, even when arbitrary.

Teague advised that the time had come for a direct confrontation. Because of the schedules of the Members and the frequency of rollcalls in the House, it was decided that the best time for a meeting would be "after the first quorum call" which usually occurred shortly after the House convened at noon. It was also decided that the meeting should take place in the Capitol, where the participants would be undisturbed by staff wandering in and out and listening to what

might prove to be an argument among Members. If there were an argument, the principals didn't want it to get around to other Members and perhaps upset the carefully arranged strategy.

On July 13, at 12:40 p.m., Miller, Teague, Davis, McCormack, and Dr. Ratchford sat around one of the long tables in the Rayburn Room. Unlike some of the other tables, where Members were sitting down with their constituents or chatting with their staffs or lobbyists, this was a very serious meeting with no stories or jokes interspersed with the vital business at hand.

On most staff issues, Miller over the years had relied very heavily on his staff director, Charles F. Ducander. Perhaps it is fortunate from the standpoint of history that Ducander was not present for this important meeting, for Dr. Ratchford immediately afterward wrote Ducander a very complete memorandum describing what happened.

McCormack opened the session by referring to his July 1 letter and memorandum, pointing out that he had discussed the subject individually with each of those present. Miller then cut in to warn of the jurisdictional overlap with the Joint Committee on Atomic Energy, and pointedly asked whether McCormack had discussed the task force with Congressman Holifield. This was a sore point with McCormack, whose respect for Holifield was tremendous, but both he and Miller knew full well that it was Holifield who had led the opposition to the Fulton select committee in May. McCormack confessed he had not discussed the subject with Holifield. He recovered his ground as well as possible by pointing out that nuclear energy was only one part of the overall objective of the task force study.

TEAGUE URGES ACTION

Perhaps it could justifiably be assumed that Miller at this stage in his career was not seriously interested in expanding the jurisdiction of the committee. Although he did not realize it, this was his last term in Congress. On the other hand, Teague was clearly looking to the future, eager to do whatever necessary to strengthen the committee and expand its jurisdiction beyond a concentration on space—which was rapidly diminishing in importance and funding support. So Teague took the bull by the horns and made some sharply worded suggestions.

He began by reminding all those present that McCormack had discussed this issue with each of them. He then in effect said the task force study ought to be approved without any further deliberation. He said that there should be an affirmative decision, and the details ought to be worked out later. Miller tried to dodge the issue, as he so frequently did, by changing the subject with a few rambling anec-

dotes. Teague became restless, moved around in his leather chair, started drumming his fingers impatiently on the table and said sharply:

George, Mike has talked with each of us about this. I'm in favor of it and think you should go ahead and establish it.

Teague mentioned that important research on thermonuclear fusion was in progress at the University of Texas in Austin, and that the task force should look into this research. Miller replied that encouraging such travel might not be wise in view of the committee's limited budget. Teague shot back that he could get Miller "an additional \$100,000 any time he wanted it" and that "a first-class job on the study should not be sacrificed for budgetary reasons."

MILLER CONSENTS TO THE DECISION

Teague then got up and said he had to leave. But he wanted a decision before he left. Davis also urged action, and finally Miller consented. This entire discussion up to that point had taken only 10 minutes, and Miller got up to leave with Teague at 12:50.

In his July 13 memorandum, Dr. Ratchford stated:

Mr. Davis and Mr. McCormack continued their discussion. Mr. Davis agreed that Mr. Seiberling and Mr. Symington would be appropriate appointees to the Task Force from the Democratic side and that Mr. McCormack would talk with Mr. Bell concerning potential Republican appointees. According to Mr. McCormack he had already discussed the issue with Mr. Seiberling and would do so shortly with Mr. Symington.

The question of assignment of committee staff members to assist in the Study was specifically put off until a later time by Mr. Davis. Earlier Chairman Miller had pointed out the desirability of bringing in Congressional Research Service staff to help the Task Force.

Reflecting back on the events in 1978, McCormack commented:

Without Tiger's support, Miller would not have agreed to it. *** I think Tiger didn't appreciate the magnitude of the problem or at that time didn't appreciate the energy crisis or the nature of all the things we got into. But he was aware of the fact that there were things going on that he wasn't up to snuff on, for instance, he mentioned to me in discussions that there was research work going on at the University of Texas that they planned to solve our Nation's energy problems, that he didn't understand.

Dr. Ratchford drafted an authorization letter and brought it to Miller on July 15. Miller signed the letter on July 19, indicating to Davis:

It is with great pleasure that I establish a Task Force on Energy under the jurisdiction of the Subcommittee on Science, Research and Development, as we discussed with Olin Teague and Mike McCormack on July 13.

In his letter to Davis, Miller stated that the objective of the task force was to study and report on research and development requirements associated with future energy needs. He cautioned that the study by the task force would be expected to complement those of other congressional and executive groups. Miller said he anticipated no duplication of effort, since the task force would be concentrating only on the research and development aspects of the energy problem.

CHARTER FOR THE TASK FORCE

In drafting the letter for Miller's signature, Dr. Ratchford blue-printed a broad charter for the task force. The letter stated:

I would expect the Study to take a considerable part of the remainder of this Congress if it is to be of the high quality which we all anticipate. The Study should define what research and development is necessary in order for the United States to cope with the current energy crisis, a crisis which threatens to become even worse in the future. Technical evaluations need to be undertaken of the various research fields associated with energy, and cost estimates made of the research and development needed, together with short- and long-range schedules for performance of this needed research and development.

Miller stated that he felt that staff investigations and reports to the task force members would be necessary. He emphasized that to be useful to the rest of the committee and Congress "the quality of information and advice received by the task force must be the highest." Miller informed Davis that Dr. Ratchford would staff the task force, and "as the activities of the task force evolve and specific staff requirements become better defined," additional staff would be assigned.

Just as the McCormack group was named a "task force" to avoid seniority and jurisdictional problems, so the concept of "briefings" rather than "hearings" arose. Miller's letter sternly cautioned:

Should hearings be necessary as the Study progresses, these would be held by the full Subcommittee on Science, Research and Development, and not by the task force.

MEMBERSHIP OF THE TASK FORCE

The next order of business was to line up the task force members. The day after Miller signed the letter to Davis, McCormack asked Miller for approval of his four nominees. This was done very speedily. On July 22, Davis notified each of the members of his appointment. The charter members of the task force were:

Democrats

Mike McCormack, Washington, *Chairman*
James W. Symington, Missouri
John F. Seiberling, Ohio

Republicans

Charles A. Mosher, Ohio
R. Lawrence Coughlin, Pennsylvania

There was no committee meeting or personal notification of other members of the committee to inform them of the creation of the task force. Instead, Miller sent out a press release for use on the morning of July 26, with copies of the press release to each committee member.

Everything moved fast for the task force, which held its organization meeting at 1 p.m. on July 28, at McCormack's Capitol Hill home. All the charter members were present, and Mrs. McCormack graciously provided luncheon for the attendees.

At its organization meeting the task force decided to undertake a self-education process through arranging for surveys of the energy problem and existing R. & D. activities, with presentations by experts in various areas. Mosher volunteered to ask the President's Science Adviser, Dr. Edward David, to discuss energy R. & D. for the task force, which he did at an August 2 meeting in Mosher's Rayburn Building office. Subsequent meetings were held in the committee rooms of the Joint Committee on Atomic Energy, high on the fourth floor of the Capitol. The task force met weekly on Mondays from 2 to 5 p.m.

BRIEFING OTHER COMMITTEES

On August 5, at the request of the task force, Miller wrote to the chairmen of a number of House and Senate committees, including Interstate and Foreign Commerce, Interior, Small Business, Merchant Marine and Fisheries, Judiciary, Government Operations, Public Works, and Joint Committee on Atomic Energy, informing them of the objectives of the task force. The letter noted:

In case your past or present activities have included research and development aspects of Energy, I would hope that your committee staff would bring this to the attention of the Task Force. * * * This procedure will assure that there will be no duplication of effort in those areas of mutual interest.

McCormack himself wrote to Speaker Albert on September 10, calling attention to the existence of the task force, enclosing a schedule of its activities, and outlining its objectives.

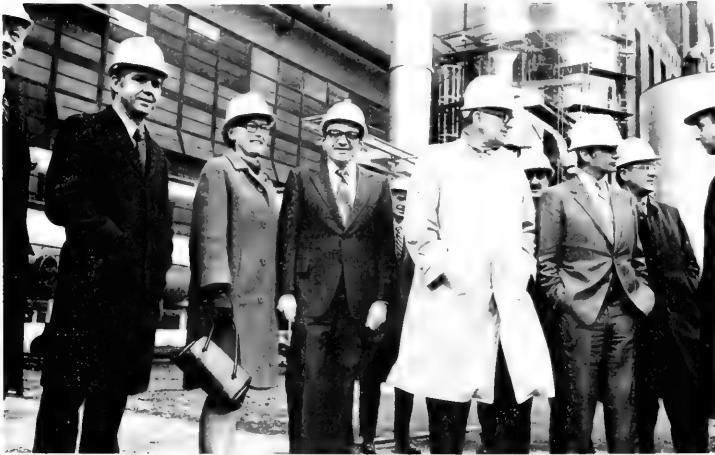
McCormack moved his task force along with methodical care. He made sure that committee members were informed when briefings were being held, and he also drew in those people and groups whose support was needed by asking them to make "presentations" at the briefings. For example, the National Academy of Sciences, National Academy of Engineering, Federal agency officials, scientists, engineers, experts in coal, oil, natural gas, solar and geothermal energy, private consultants, industrial leaders—a good cross section of some of the most knowledgeable experts in the Nation came to brief and present papers to the task force.

McCormack relates:

We were free to study absolutely anything at all. * * * Teague and Davis gave us very strong support, and George Miller was more or less indifferent to our activities. * * * As a subsidiary of the Davis subcommittee, that gave us a little additional insulation.

STAFF SUPPORT FOR THE TASK FORCE

McCormack was very fortunate in receiving excellent staff support from Dr. Ratchford, Dr. John Andelin who at that time worked with the task force out of McCormack's congressional office, and a number of staff personnel at the Congressional Research Service. Dr. Ratchford, a University of Virginia Ph.D. in physics, had taught at Washington and Lee University and had worked for the Air Force Office of Scientific Research prior to joining the committee staff in 1970. Andelin, a Ph.D. from the California Institute of Technology, had been a senior research scientist in cryogenics at Ford Scientific Laboratory in Dearborn, Mich., and later a research associate in solar physics at Harvard University.



Task force on energy visit to Commonwealth Edison Co., Chicago, Ill., to inspect removal of sulfur oxide gases from burning of fossil fuels. From left, Dr. J. Thomas Ratchford, Mrs. Mike McCormack, Representatives Mike McCormack (Democrat of Washington), Charles A. Mosher (Republican of Ohio), James W. Symington (Democrat of Missouri) and plant representatives.

In addition to presenting a briefing on September 13, 1971, the Environmental Policy Division of CRS produced a voluminous study for the task force, published as a committee print, entitled "Energy—the Ultimate Resource." This first task force publication was a compendium of material on the current status of world energy production

and consumption, indicating where research and development fit into the overall energy policy issue. McCormack also recruited another of his staff members, Kirk Hall, who later joined the committee staff, to assist the task force. From the minority side, Joseph Del Riego pitched in to help also. Warren H. Donnelly of the Environmental Policy Division, Congressional Research Service, was consistently helpful in augmenting the staff.

In addition to the highly successful Monday afternoon briefings, the task force took two field trips and visited nine major energy installations from coast to coast. The first trip in October 1971 was an inspection of the Princeton University Plasma Physics Laboratory, where research on controlled thermonuclear fusion had been in progress since 1951. On the same trip, the task force visited the FMC Corp. in Princeton, N.J. to look at pilot plants and R. & D. in coal gasification and liquefaction.

A January 1972 field trip took the task force to Chicago, several locations in California and Austin, Tex. to see at first hand what was developing in geothermal, fission and fusion, and new uses for coal and other forms of energy.

AN IMPORTANT VISIT TO TEXAS

Whatever the task force learned throughout these field trips could not equal what McCormack added to his excellent standing with Teague as a result of the January visit to the University of Texas. Teague was deeply interested in the energy work progressing at the Center for Plasma Physics and Thermonuclear Research at Austin, Tex. As noted above, he had mentioned this at the July 13 meeting when he bulldozed the way clear with Miller to allow the original establishment of the task force. The fact that McCormack swung his task force down through Austin on the return trip from California, after stopping in Chicago—scarcely a very direct route to Washington, D.C.—seemed to have had an influence on an important decision which Teague made at the end of 1972. But this is getting a little ahead of the story.

As 1972 progressed, two membership changes were made on the task force. At the request of Esch, Mosher stepped aside to allow him to become a task force member. But Mosher, who by this time had replaced Fulton as the ranking minority member of the full committee, thereby remained as an *ex officio* member of the task force. Due to the pressure of other duties, Symington gave up his slot to Hanna. These changes made little difference in the work or character of the task force, however, as McCormack continued to be the real leader.

The year 1972 was a very successful one for the task force. Gradually, the documents produced (three separate reports containing the "briefing" papers and an analysis thereof), plus a 1724-page publication entitled "An Inventory of Energy Research" gained renown for the task force. The "Inventory" had actually been compiled by the AEC Oak Ridge National Laboratory, thanks to a grant from the National Science Foundation. Published by the task force as a committee print, it helped build the task force reputation for timeliness, accuracy, and usefulness.

ENERGY HEARINGS BY DAVIS SUBCOMMITTEE

At a meeting of subcommittee chairmen on February 1, 1972, Davis obtained Miller's permission to escalate the task force activity by holding public hearings. Davis explained in a later memorandum to Miller on February 23:

These hearings would be an extension of and build upon the work done so far by the Task Force on Energy headed by Mike McCormack. *** I feel that hearings on energy research and development will be valuable to the committee and the Congress, and will generate a valuable public record of information from the scientific and technological community on this subject.

As promised to Miller, the public hearings were actually staged by the SRD Subcommittee, but it was clear that the task force was dominant in planning and implementing the effort.

In opening the seven days of hearings, during May, Davis stated:

The fact that we face a potentially devastating energy crisis has, during the past year or two, come to the attention of more and more people in this country, including those of us serving as Members of Congress.

Davis had high praise for McCormack, whom he again identified as "the only scientist also sitting as a Member of the House of Representatives." For his part, McCormack complimented all the members of his task force, summarized their work and accomplishments, and then added:

I am optimistic that these hearings will be useful in evaluating our energy R. & D. efforts in the context of a national energy R. & D. policy. I hope we can determine some of the components of that policy, the questions yet to be answered and the means by which such a policy can be implemented.

May 1972 marked a change in Chairman Miller's interest in the task force. On November 19, 1971, during a "special order" address by McCormack, interspersed with high praise from a number of colleagues, Miller had been somewhat restrained:

I want to congratulate Mr. McCormack as chairman of the Task Force for the constructive and fine work he is doing and assure him we will give him our full support.

As the May 1972 Science Subcommittee hearings on energy opened, with former Presidential science adviser Dr. Killian as the leadoff witness, Miller was very noncommittal when Davis, the subcommittee chairman, asked him to deliver some opening remarks. Miller's complete remarks follow:

There is nothing that I could add to what you and Mr. McCormack have said, other than to welcome an old friend, Dr. Killian back. Dr. Killian has been a staunch supporter of this committee since the days of its organization. I am happy to see him here. Unfortunately, I cannot stay very long, but I did want to come and pay my respects to Dr. Killian and his associates.

This was scarcely much of an endorsement of the work of the task force.

MILLER INITIATIVE ON SOLAR ENERGY

But later in May, Yeager talked at length on several occasions with Miller about solar energy and its potential. He pointed out that the task force briefings showed that a vast preponderance of energy research was being concentrated on short-term needs, with only a sprinkling of effort pointed toward long-range needs which could be partially supplied through solar energy. Facing a difficult primary election in June, Miller became persuaded that a strong statement on solar energy would help in California. Miller wrote letters to NASA, NSF and the National Bureau of Standards, as well as the Congressional Research Service, asking them to pull together what was being done and also what could be done to produce a coordinated effort in solar energy research. The CRS study was focused primarily on industrial materials research, the pacing factor in any solar energy research.

Armed with preliminary replies from the agencies, on May 31, 1972 Miller delivered a major address on solar energy in the House of Representatives. He mentioned that in 1972, the total amount being requested for energy research was \$700 million—about 4 percent of the total Federal R. & D. budget. And of the \$700 million, a pitifully small \$13 million—less than 2 percent of the energy budget, was going for solar energy research by NASA and NSF. "Something is wrong with our priorities," Miller told the House. "In my view, we are going to need an effort comparable in spirit and commitment to the one we put into the space program in the 1960's in order to achieve our solar energy needs." Miller also suggested the formation of a joint executive-legislative-industry task force to provide a "consistent, coherent and intensive assault on the enormous research problems inherent in the production and use of solar energy." He advocated the promulgation of a future statement on solar energy policy which might eventually be incorporated into public law.

Miller's initiative was followed up by additional letters to the agencies involved. Detailed reports from these agencies were then compiled and published by the committee at the end of 1972, summarizing who was doing and planning what, and the obstacles in the way of a successful development of solar energy research. The entire package, analyzed by the committee was published in a 119-page report entitled, "Solar Energy Research: A Multidisciplinary Approach." As we shall see, it helped provide a good foundation for legislation enacted in 1974.

FINAL REPORT OF TASK FORCE

In the closing months of 1972, the task force took stock of its work and decided to put on a final burst of speed and concentrate on a crisp but comprehensive final report. Tentative conclusions and supporting material were assembled. On October 11, Miller wrote to the members of the Research Management Advisory Panel:

At this point in time I think the report may recommend a significant increase in the Nation's R. & D. efforts oriented toward energy. Of vital importance are the questions of how this increased R. & D. effort should be funded, and the organizational reforms necessary in the public and private sectors to manage such R. & D. efficiently and effectively. Accordingly, I am asking that the Research Management Advisory Panel apply its unique expertise to these questions and advise the Task Force on alternative courses of action.

The RMAP had an all-day meeting in the Faculty Club of the Massachusetts Institute of Technology in Cambridge, Mass. Their comments, along with the briefings and the May hearings helped to crystallize material for the final report of the task force, a 404-page product termed very simply "Energy Research and Development." This report also enhanced McCormack's reputation as an energy expert. Interestingly enough, it probably helped him more within the Congress than in the general public. As explained subsequently by McCormack:

We didn't try to make a sensational report. It's always been our habit to try to report practically and methodically what we're doing, what the problems are and what the solutions are rather than sensationalizing the stuff, so the press didn't pay a lot of attention to us. We did get a little coverage but not an awful lot.

Although the task force itself officially went out of existence at the end of the 92d Congress, the staff struggled with the report well into the early weeks of the 93d Congress in 1973 to insure that it was of the highest caliber. For example, McCormack asked the members of his task force as late as January 31 to submit their comments by February 7 on the draft conclusions and recommendations.

The report recommended:

1. Now is the time to implement a greatly increased national energy research and development effort. Studies alone are not enough. Adequate funds and technical manpower must also be committed.

(2) Organizational reforms are needed in the executive branch of Government in order to effectively coordinate and direct a greatly increased national energy R. & D. effort within the context of an overall national energy policy.

(a) A focal point for energy policy must exist in the White House

(b) An operating agency with responsibility for managing Government supported energy R. & D. should be established as soon as possible.

(3) The issues of environmental protection and energy conservation must be paramount in any national energy policy and should receive greatly increased research and development support.

(4) The Nation must set priorities among technological opportunities for investment in research and development. We cannot support all energy research and development alternatives at the levels which are suggested by their proponents. Evaluation of current data indicates the following areas of activity should have the highest priority.

(a) Basic research.

(b) Materials research.

(c) Solar energy.

(d) Geothermal energy.

(e) Nuclear breeders.

(f) Coal (gasification and liquefaction must be brought to commercial demonstration as rapidly as possible).

(g) Fusion.

TEAGUE TAPS MCCORMACK FOR SUBCOMMITTEE CHAIRMANSHIP

In the closing days of 1972, as Teague was preparing to take over the chairmanship of the committee he asked McCormack to come over to his office and talk with him. McCormack relates:

He completely swept me off my feet, as he quite spontaneously said in a very excited tone: "This energy crisis is a serious matter and we got to get into it and I want a subcommittee on energy and I want you to be chairman of it." Of course, I was flabbergasted, since I was a freshman at the time, heading for my sophomore term. I commented to him that this was going to be a pretty tricky problem to make me chairman of a subcommittee when I was a very junior member of the committee. He said that he'd take care of that.

At the opening of the 93d Congress in 1973, when Teague assumed the chairmanship, McCormack ranked 10th on the committee. Hanna, No. 7 in seniority, was the lowest ranking Member assured the chairmanship of a subcommittee. Flowers ranked eighth and under the rules of seniority was entitled to take the next subcommittee chairmanship. Although interested in energy and having a sizable amount of coal production in his Alabama district, Flowers did not have the good fortune to have been assigned to the task force on energy which McCormack piloted in the 92d Congress.

There is no question that all the rules of tradition, plus Flowers' interest and that of his district, justified his selection to chair the new Energy Subcommittee. As a conservative who revered the rules and traditions of the House, Teague might have been expected to

favor Flowers for the new subcommittee position. There are several reasons why McCormack was allowed to pluck the plum. Teague was impressed with the aggressive manner in which McCormack had headed the task force. He admired the way the task force received lots of attention from the scientific community and the trade journals, yet not too much of the kind of publicity which stirred the jurisdictional jealousy of other committee chairmen. McCormack made sure that Teague heard from NASA and NSF officials, as well as others whom Teague respected, about the tremendous job the McCormack task force was doing. On several occasions, Teague had mentioned to McCormack the work being done at the University of Texas, and when McCormack took his task force out of the way to visit that facility, followed by excellent reports from Austin, McCormack's stock went way up. Most important of all, Teague fully recognized that space could no longer be the centerpiece which dominated the Science Committee, and to extend the emphasis to cover energy would pave the way for a far broader-based committee jurisdiction. Teague knew that McCormack, no shrinking violet, had shown his eagerness to branch out aggressively. So why not take a chance, even though it meant a personal affront to both the system and Flowers?

ANNOUNCING THE DECISION

Teague swore McCormack to secrecy in advance of a caucus of the committee Democrats at the opening of the 93d Congress in 1973. He told McCormack he'd "take care" of it, and it was to McCormack's self-interest to stay mum. Asked in 1978 if it were a well-kept secret, McCormack responded:

Oh yes, I think that it was. He said that he'd take care of it and he did. I had no clear notion of what he was going to do.

The atmosphere was very pleasant when Teague walked into the committee room for the Science Committee Democratic Caucus early in 1973. The committee members were eager to give Teague the strong backing he deserved as he started off his chairmanship. As he rattled off the issues the committee would tackle, it became apparent that the committee had a determined leader who was really going to run the show and take the committee out of the doldrums suffered in the latter Miller years. It was also a time when a new committee chairman deserved a honeymoon, rather than a challenge to his authority. So when Teague crisply sprung the news that he was setting up a Subcommittee on Energy, and Mike McCormack would serve as its chairman, the fait accompli was like a speed ball whizzing by an unsuspecting batter. Nobody raised an objection, of course, so the deed was done mercifully.

ENERGY SUBCOMMITTEE MEMBERS

In the early days of the Science Committee, everybody tried to get on what was then the most prestigious subcommittee: Manned Space Flight. By 1973, it was easy to see which subcommittee was the most popular—18 out of the 29 full committee members asked for and were placed on the Subcommittee on Energy. By the end of the 93d Congress, the size of the committee was expanded to 19 to take care of a newly joined member of the full committee: Representative William M. Ketchum (Republican of California). The members of the Subcommittee on Energy included:

Democrats

Mike McCormack, Washington, *Chairman*
 Don Fuqua, Florida
 James W. Symington, Missouri
 Richard T. Hanna, California
 Robert A. Roe, New Jersey
 Bob Bergland, Minnesota
 J. J. Pickle, Texas
 George E. Brown, Jr., California
 Dale Milford, Texas
 Ray Thornton, Arkansas
 Bill Gunter, Florida

Republicans

Barry M. Goldwater, Jr., California
 John W. Wydler, New York
 Marvin L. Esch, Michigan
 John B. Conlan, Arizona
 Stanford E. Parris, Virginia
 Paul W. Cronin, Massachusetts
 James G. Martin, North Carolina
 William M. Ketchum, California

On the morning of February 26, 1973, Teague called an organization meeting of the full committee. As he had in the caucus, he rushed through the announcement of the McCormack subcommittee:

We've added one new subcommittee this year, and that's the Energy Subcommittee. In the last Congress we had a Task Force on Energy, and there are plenty of reports from that task force, which some people might want to read.

Brown, Mosher, and Winn all commented on the need to fight for broadening jurisdiction for the committee in the upcoming reorganization efforts, particularly in the area of energy. So there was general praise for Teague's having the foresight to create a separate Subcommittee on Energy. The issue of seniority was not raised, and in fact five Democratic members who were senior to McCormack joined his subcommittee and sat below him in the committee line as he chaired the meetings.

An overview of the sheer volume of the activities and accomplishments of the Energy Subcommittee during 1973 and 1974 can be appreciated by the following summary:

Legislation enacted:

Solar Heating and Cooling Act of 1974.
 Solar Energy Research, Development, and Demonstration Act of 1974.
 Geothermal Energy Research, Development, and Demonstration Act of 1974.

Meetings: 52.

Number of witnesses: 175.

Number of hearings and reports issued: 27.

Pages of printed hearings and reports: 10,256.

It might be noted that this was the most voluminous product of any subcommittee then operating, and also constituted a record up to that time. The record has since been eclipsed, with the expanded statutory jurisdiction of the committee as well as the expansion of the committee staff. But back in the good old days of 1973-74, the prolific hearings, publications, and legislative output of the subcommittee were regarded with a great deal of awe.

THE FIRST ENERGY BRIEFINGS

Within a short time after the organization meeting, the new subcommittee organized a series of briefings, starting with James E. Akins, Director of the Office of Fuels and Energy for the Department of State, and followed by Jack Bridges of the Joint Committee on Atomic Energy staff. Akins, who had been stationed in Kuwait, talked on the implications of this country's dependence on Middle East oil. Bridges, armed with three-dimensional multicolored graphs, delivered a briefing he had done many times on the future projections of energy supply and demand. The third briefing on nuclear energy was presented by—guess who?—Mike McCormack himself.

Aside from the substantive content of these sessions, they served to spread the word around Congress about the subcommittee's leadership. McCormack sent invitations to "All Members of Congress" and followed up personally to draw noncommittee members to see what was being accomplished. Among noncommittee members who attended were Majority Leader O'Neill, and Representatives Chet Holifield (Democrat of California) and Mel Price (Democrat of Illinois). McCormack started another practice which publicized the subcommittee's work: he sent to all Congressmen and interested outsiders a series of "Energy News Notes" done up in a colorful style with the subcommittee chairman's name in large type at the top. Jack Swigert, who had recently taken office as executive director of the full committee, pointed out that McCormack's name had appeared in large letters, with Teague's identification underneath in much smaller letters. This lack of balance was later corrected. Brushing aside these picky points, McCormack tackled his new job with great vigor and high visibility.

SHORT-TERM ENERGY SHORTAGES

By May, the committee started formal hearings. With the pinch of gasoline shortages being acutely felt throughout the Nation, the

subcommittee launched three days of hearings on "Short-Term Energy Shortages and Policy Options." McCormack announced at the outset:

The public expects the Congress to see to it that adequate provisions are made to avoid unnecessary shortages and, at the very least, to be certain that all essential services have adequate fuel and electricity. Contingency plans should exist to handle any critical situation within this area that may develop during the next 12 months.

Not until 1975 did the committee officially gain jurisdiction over energy research and development. Even under the expanded 1975 jurisdiction, it is a question whether an inquiry into gasoline and home heating oil shortages fell within the purview of the committee. But the McCormack hearings attracted wide attention because they dealt with hot issues which were on everybody's mind. Increasingly, McCormack was making a name for himself as the man concerned about energy.

Out in St. Louis, McCormack teamed up his subcommittee with Symington's Space Science and Applications Subcommittee for the first of several joint hearings on "Energy Research and Development and Space Technology." Returning to Washington, D.C., the joint hearings continued as McCormack laid the foundation for expanding his subcommittee jurisdiction by linking his inquiries to both the present interest and future potential of NASA and NSF. Since both those agencies were clearly within the committee's jurisdiction, nobody could raise a question about predatory ventures across the borders. Meanwhile, McCormack never lost an opportunity to campaign for greater emphasis on the NSF's research applied to national needs program (RANN), which enabled NSF to expand its activities in the energy area—particularly in solar energy. NASA, through its energy-related work in developing aeronautics, satellites, and other space systems, told the McCormack subcommittee that NASA's capabilities and technologies "can be put to work on terrestrial problems of generation, conversion, and conservation of energy."

In June and July of 1973, McCormack's subcommittee stepped up its activity. Reports were starting to move off the press, including "The Federal Government and Energy R. & D.: A Historical Background" and "Energy Facts." Also, Kirk Hall of the staff prepared a brief set of energy conservation tips. It was published, attracting the attention of Representative Henry S. Reuss (Democrat of Wisconsin). Congressman Reuss, at that time Chairman of the Subcommittee on Conservation and Natural Resources of the House Government Operations Committee, held four joint hearings with McCormack during the summer of 1973 on the subject of energy conservation. In opening the hearings, Reuss stated:

I particularly want to praise this excellent little booklet which, while it has the format of all our committee prints and reports, is surely something that every American ought to carry with him and practice.



McCormack subcommittee holds joint hearings with Reuss subcommittee. From left, Representatives Ray Thornton (Democrat of Arkansas), Richard T. Hanna (Democrat of California), McCormack, Henry S. Reuss (Democrat of Wisconsin) and staff.

There was a tremendous upsurge of national interest focused on alternative forms of energy, as the gasoline shortages began to make more and more people aware of energy issues. Solar energy, geothermal, fusion, and conservation were the four battle cries of the environmentalists. McCormack rarely mentioned environmentalists without calling them either "environmental extremists" or "extreme environmentalists." But he had welcomed their support in expanding the scope of the task force. Fusion and the breeder reactor he could talk about as a member of the Joint Committee on Atomic Energy, but his own Subcommittee on Energy could not go very far in these areas. Reflecting on the situation as he looked back on it in 1978, McCormack said:

After all, the Interior Committee did have the Office of Coal Research in its jurisdiction and the Joint Committee had all nuclear energy, so we took the areas that nobody else had to start with. There was no activity in them at all. So that was solar and geothermal and conservation and that's where we spent our time and efforts primarily.

SOLAR HEATING AND COOLING BILL

In the summer of 1973, the McCormack subcommittee held hearings on two aspects of solar energy: The generation of electricity, and the use of solar energy for heating and cooling purposes. Considerable

enthusiasm supported action in both of these areas, but McCormack indicated at the June 1973 hearings: "The consensus of the technological community seems to be that the commercial operation of solar power to electrical generators is still many years in the future." In assessing in 1978 what he had been able to accomplish in 1973, McCormack reflected:

We also recognized that solar heating and cooling was the first area where we could easily conceive a rational, responsible research, development and demonstration program. We could conceive it ourselves without any significant outside help, we held hearings and had it fundamentally confirmed that we were on the right track, and went ahead and moved this legislation out.

Drs. Ratchford and Andelin, who worked on drafting the legislation, tied it very closely to activities of NASA, NSF and the National Bureau of Standards—all of which were within the committee's jurisdiction. The Department of Housing and Urban Development was also drawn in to evaluate the performance of the solar units. The central concept was to add the magic word "demonstration" beyond research and development, to show that solar heating and cooling would indeed work if demonstrated with several thousand buildings over a period of several years. One of McCormack's greatest contributions was to expand the use of research and development to be married with "demonstration."

Although the OMB designated NSF as the lead agency for solar energy research, thus strengthening the committee's jurisdictional claim to the bill, McCormack reports:

We never did have a complete agreement with the Administration. The Administration opposed the legislation.

Nevertheless, the Republicans on the committee strongly supported the bill. Goldwater, the ranking Republican on the subcommittee, was one of its most active supporters, as was Mosher. Teague, Mosher, Goldwater, and McCormack joined as the principal sponsors of the solar heating and cooling bill when hearings were resumed in November to finalize the details. By now the Middle Eastern oil embargo had struck the United States, and everybody was starting to get on the energy bandwagon. Fully 187 Members of the House of Representatives rushed to cosponsor the solar heating and cooling bill.

With that kind of motherhood support, McCormack did not have to be concerned with whether he was invading the jurisdiction of any other committee. The legislative history was carefully printed up to show that for a dozen years Members had been introducing bills on solar energy. Actually, one of the first solar energy bills had been introduced in 1962 by Congressman Anfuso while an early member of the committee. The legislative history went into the background of how the task force had worked on the issue, followed up by the December 1972 reports of both the committee and agencies.

When the solar heating and cooling bill was taken up in full committee on December 14, 1973, Wydler stated:

As a member of the subcommittee, I truthfully want to compliment the Chairman on the way he has pursued this whole subject. *** I know a lot of people in the country still think that solar heating and cooling is kind of a Buck Rogers type of a proposition, but the truth of the matter is it is a proven method of doing the job and it does work. The questions that really have to be answered are the economics of the situation, and I think this bill will give us the economic facts to demonstrate one way or another whether it is economically feasible to actually try to heat homes and businesses and cool them with the power of the sun. That is what we are really going to try and find out in this program.

The subcommittee had prepared the ground carefully. Three field trips had been made to evaluate solar heating and cooling technology in Albuquerque and Los Alamos, N. Mex., and in Washington, D. C. The Manned Space Flight Subcommittee also reported on a successful solar heating and cooling building at Marshall Space Flight Center in Huntsville, Ala. Colonel Gould made an extensive report on similar developments at Langley Research Center and solar research at Lewis Research Center.

THE TWO-TRACK EFFORT

The McCormack subcommittee actually proceeded on a two-track system during the fall months of 1973. While the solar heating and cooling legislation was being developed, hearings were started in November on the "Geothermal Energy Research, Development, and Demonstration Act." Once again, Teague, Goldwater, Mosher, and McCormack were the principal cosponsors. The legislation aimed to coordinate and speed up applied research in various types of geothermal technology in order to hasten its use to generate electricity. The subcommittee recognized that some electric power was already being commercially generated from hot and dry steam, and the legislation was designed to expand exploration and techniques for utilizing hot dry rock and other geothermal technology.

Both the solar and geothermal bills became entangled in the big issue of what kind of an energy policy and organization should be put in place by the President and the Congress. Since his message to Congress in June 1971, urging the establishment of a cabinet Department of Natural Resources, President Nixon had made several proposals along the lines of consolidating energy agencies. The cabinet proposal was not pushed very hard, and a series of energy coordinators moved in and out of the White House. The clarion call in December 1972 for a single national energy policy and the coordinated organization to accompany it—issued by the McCormack task force on energy—were not heeded. In June 1973, President Nixon appointed Gov. John A. Love of Colorado as an energy czar, asked Congress for a cabinet

Department of Energy and Natural Resources including a new Energy Research and Development Administration, and announced a 5-year, \$10 billion program for energy R. & D. Following the Yom Kippur war and the Arab oil embargo in October 1973, Governor Love was replaced by William Simon to set up a new Federal Energy Office in the White House. In November, President Nixon announced "Project Independence" to make the United States energy self-sufficient by 1980. He also asked in November that Congress give separate and priority attention to the proposed Energy Research and Development Administration (ERDA) before dealing with the cabinet Department of Energy and Natural Resources.

On November 26, 1973, McCormack persuaded Teague to convene a special all-day meeting of the Research Management Advisory Panel to discuss policies and legislation in the area of Federal organization for energy. McCormack presided over the meeting, which was a hush-hush and off-the-record affair. Teague, Fuqua, Symington, and Mosher were the only Members present. Almost all the RMAP members were there, as well as Daddario, who by that time had been designated as the OTA Director. Hon. Dixy Lee Ray, Chairman of the Atomic Energy Commission, briefed the group on a report the President had asked her to prepare on how to allocate an additional \$100 million in Federal funds for energy. Several other administration energy officials also talked about the current administration thinking on energy organization. Committee members came away disappointed that there apparently was no strong disposition to consolidate the bits and pieces of energy activities spread around in various departments and agencies. To McCormack especially, the concept that one R. & D. agency (ERDA) be divorced from the Federal Energy Administration, and from policy assessment work in the Department of the Interior, Federal Power Commission and other agencies amounted to proliferation of a disorganized, confused nature.

MCCORMACK'S APPRAISAL OF ERDA LEGISLATION

On November 28, 1973, McCormack testified before the House Government Operations Committee against the bill to create ERDA. He argued, as had the December 1972 task force report, that there must be a systems approach along with one central agency to control all "research, development, and demonstration" as well as assessment and policy.

He raised the question why solar heating and cooling and geothermal power development were being transferred out of NSF, while other solar energy R. & D., wind energy, battery R. & D., and fuel cells were not being transferred. He asked:

If solar heating and cooling is included, why not housing design and standards for energy efficiency?

At the December 14, 1973 markup of the solar heating and cooling bill, the following colloquy occurred:

Mr. HECHLER. Mr. Chairman, I would like to ask the gentleman from Washington about the attitude of the administration toward this bill.

Mr. McCORMACK. The administration witnesses, when the bill was first heard, all supported the idea of the bill, but suggested the ERDA bill be passed. They didn't say instead, but they said as an order of priority they thought the ERDA bill should be passed.

The response of this committee was then to prepare Section 13, which allows the administration of this program to fall into ERDA or any other Federal agency if it comes into being.

Aside from that, certain members of OMB have expressed a desire that solar energy research and development be managed by the National Science Foundation. And we have pointed out to them this is not a research and development program, but a demonstration program. They have sort of grudgingly accepted this fact and offered no objection to the bill. They say well, they think it is better funded through NSF, but that is as far as it's gone.

OMB OPPOSITION TO SOLAR HEATING AND COOLING

Early in 1974, Teague, McCormack, Mosher, and other committee members put heavy pressure on the administration to try and persuade them to support the solar heating and cooling bill. The OMB reiterated its position that the demonstration program should wait until ERDA was established. At that point the ERDA bill had passed the House but not the Senate. OMB also wanted NSF to administer all solar energy research and technology funding, and the bill provided that NASA should be in charge of contracting for and installing the solar demonstration units. The difference of opinion with OMB touched off a long argument during the spring of 1974 which spilled over into the issue of which agency should take the initiative in fostering solar satellite power development. Many conferences were held between the committee members, staff, and OMB Director Roy L. Ash and his assistants.

Teague finally informed Ash that despite OMB opposition, he was going to take the solar heating and cooling bill to the House floor with or without their support, and he would beat them over the head with an overwhelming, veto-proof majority in the House. He fired off a final blast to Ash on February 8, a letter remarkable in its belligerent tone. Teague labeled OMB's opposition to the bill as "shortsighted and unwise." He said that OMB's position "represents an internal contradiction within the administration." Teague noted that he had opposed the creation of ERDA because, like McCormack, he did not believe it went far enough in consolidating responsibility for energy. He added:

In spite of this opposition to ERDA, I encouraged my committee to include, in our markup of the bill, a new section that provided for transfer of this Solar Heating

and Cooling Demonstration Program to ERDA or a similar agency when such agency is created. We have gone 99 percent of the way in meeting your position and I object to your further holding of this bill as hostage awaiting the enactment of ERDA. I do not think the American people or the Congress will find your position to be a responsible one.

In response to the second objection, I cannot disagree with the OMB position that funding for solar energy research and technology should be centralized. However, the lead agency for solar energy R&D has its expertise in basic research, and does not have the experience and success in technology development, and hardware demonstrations that other agencies have—particularly NASA. NSF has never managed a demonstration program and, furthermore, the NSF Director testified before this committee that this basic science agency should not be in charge of such a hardware demonstration. I agree with this position. * * *

This demonstration program must be implemented now. I hope you will reconsider the OMB position on H.R. 11864.

ENTHUSIASTIC SUPPORT FOR MCCORMACK BILL

When the bill reached the floor on February 13, 1974, Members jammed up the aisles near the microphones to register their support for the bill. It was a demonstration of genuine enthusiasm as Democrats and Republicans alike praised the bill and the work of the committee which produced it. Mosher, after recording his strong support for the bill, stated:

As ranking minority member of the Science Committee, for the record and for purposes of accuracy and fairness, I believe I have an obligation to point out that the administration is officially opposed to this bill. * * * OMB has urged that we delay action on this bill until ERDA comes into being. Frankly, Mr. Chairman, I do not consider that a convincing argument for delay. I believe our plan in this bill can easily and effectively be coordinated into any future ERDA or other possible reorganization plan for energy-related R. & D.

In addition to congratulating Teague, Mosher, and Goldwater for their teamwork in putting the bill together, McCormack also praised Dr. Harry E. Thomason, a resident of Washington, D.C., who had been operating a solar home for a number of years. The committee visited the Thomason home during the development of the legislation to gain insight into how the solar heating and cooling system actually operated. It was a proud day for Dr. and Mrs. Thomason to be in the gallery to witness the passage of the legislation.

During the amending process, Representative William A. Barrett (Democrat of Pennsylvania), chairman of the Housing Subcommittee of the Banking and Currency Committee, offered an amendment striking out one section of the bill relating to the mortgage authority of the Department of Housing and Urban Development. Barrett argued that this belonged in his committee's jurisdiction, and he promised to include it when marking up the general housing bill a week hence. To

avoid a possible defeat on the floor, Teague stated that he would accept the Barrett amendment. Mosher reacted:

We on our side of the aisle are extremely reluctant to accept this maneuver. However, speaking at least for myself alone, I will yield to the wisdom of my chairman, and I personally am willing to accept the commitment of the gentleman from Pennsylvania, but, I want it on the record, it is with considerable reluctance.

TEAGUE WINS IN SPITE OF HIMSELF

A remarkable thing then occurred. Representative Chalmers P. Wylie (Republican of Ohio), who was also a member of the Banking and Currency Committee, startled the House when he arose to say:

I am a little surprised that the chairman of the Committee on Science and Astronautics would yield so quickly and willingly. I had, of course, thought of the gentleman from Texas as a kind of tiger, and indeed he is affectionately nicknamed "Tiger," but since he moved from the chairmanship of the Committee on Veterans' Affairs to the Committee on Science and Astronautics, he has become a sort of timid tiger, it seems to me.

Smiling, Teague confessed that "occasionally one gives up a battle to win a war, and this is not over by any means." He pledged that if the provision did not show up in the Senate, then "in no way, shape or form would I yield in conference." That wasn't enough for Wylie. He said it would be silly to report the same language out in the housing bill, with all that additional printing cost and waste of time and effort. The upshot was that Barrett's amendment was shouted down and Teague won in spite of himself. It was a further illustration of the gung-ho support for solar energy.

When the roll was called on final passage of the bill, the legislation won by the crushing majority of 253 to 2.

THE SENATE AND THE CHRISTMAS TREE

When the Senate took up the solar heating and cooling bill, an example of both its complexity and popularity was the fact that five Senate committees each had a hand in considering the legislation. In the Senate, a number of "Christmas tree" amendments were tacked onto the bill. According to McCormack:

We had trouble in the Senate. When we sent the solar heating and cooling bill over there, a bunch of the people who had become solar advocates wanted to trim it up by adding every conceivable concept to that bill.

McCormack then recalled:

I wrote a rather blunt letter to a whole bunch of them saying that if they would recognize that this program was one that we could initiate now, a specific program, that if they would kindly keep their cotton picking hands off it and pass it the way we conceived it, I would immediately sponsor another bill which would be an omni-

bus, long-range research, development and demonstration program for all forms of solar energy, and they could add all their ideas to that. Surprisingly, we had the bill through the Senate just about the way we asked for it.

The conference committee was loaded with the five Senate committees represented, facing off against the lone House Energy Subcommittee. The bill's final version provided \$50 million over a five-year period, with NASA spearheading the effort in collaboration with HUD. As members of the conference committee which had worked out the compromises between June and August 1974, Wydler and Mosher both endorsed the conference report. The only voice raised against the legislation was that of Representative Steven D. Symms (Republican of Idaho), who argued that there was no reason why the creative forces of American free enterprise could not fully develop and market solar energy at a reasonable cost to consumers. After clearing the Senate unanimously, the legislation passed the House by 402 to 4 on August 21, 1974.

TEAGUE URGES BROADENING NASA'S CHARTER

In the fall of 1973 and early months of 1974, the committee engaged in a unique form of direct sparring with OMB over many issues relating to energy policy. The first 1973 meeting with OMB Director Ash and his assistants had been very inconclusive and seemed to some committee members more as a public relations gesture or get-acquainted session than any real effort to seek congressional intent which might modify administration policy.

On October 16, 1973, Teague wrote the President urging, among other things, that NASA's charter be broadened to become the lead agency in "developing dependable systems for solar heating and cooling, as well as for the exploitation of geothermal energy." In addition, Teague pointed to bills introduced which would give NASA primary responsibility for "developing alternative ground propulsion systems to those now employed which require an intolerably high level of energy consumption while producing the same level of pollution." Teague added:

It is neither my desire nor intent to suggest alteration of the current Space programs which you are generously and, I believe, wisely supporting. * * * My point is rather to emphasize that the experience and expertise acquired by NASA in accomplishing major tasks that are at once complex and concrete is unique within the Federal establishment. We should, to my mind, capitalize on this talented, versatile resource to a greater extent than we thus far have.

After a perfunctory acknowledgment from a White House staff subordinate, Teague's letter was turned over to OMB Director Ash. In a brief response on November 5, Ash kissed off the idea by pointing out

that other agencies were already using NASA's expertise on a reimbursable basis (EPA, HUD, NSF, Departments of Interior and Agriculture were cited as examples) and "we believe there are major advantages in having other agencies draw on NASA for assistance rather than to broaden NASA's mission." Teague took his pen and covered Ash's answer with a giant question mark. It seemed to Teague that if other agencies were already calling on NASA for assistance, that was proof positive that NASA could pitch in and do other things also if given the authority. Ash wrote Teague this exasperating conclusion:

It appears preferable, in our view, that the level and direction of research and development be determined by mission agencies that are close to the problems to be dealt with and to the potential applications of R&D results. Furthermore, a broader mission for NASA might detract from its space and aeronautical capabilities.

NSF OR NASA: WHICH SHOULD BE LEAD AGENCY IN SOLAR?

In the same letter in which Teague blasted Ash for OMB's opposition to the solar heating and cooling bill, he suggested that since OMB wanted all solar energy research in one place he would see to it that all solar energy research was transferred from NSF to NASA. On the same day, February 8, 1974, Teague sent NASA Administrator Fletcher and NSF Director Stever copies of his letter to Ash and asked Fletcher and Stever for detailed plans, including required personnel shifts, for making the transfer of solar research to NASA. About the same time, Staff Director Swigert, a strong booster of satellite solar power, found considerable interest in the subject among committee members. A consortium of A. D. Little-Grumman-Raytheon-Textron had submitted a proposal to Dixy Lee Ray during her energy study for the President, and the committee took a direct interest in seeing NASA start some work toward ironing out the bugs in the proposal.

All this activity suddenly awakened OMB to understand that the committee meant business. On February 25, Ash responded at greater length and with considerable more directness to Teague's blistering letter. By now, Ash had seen the thundering majority accorded to the solar heating and cooling bill by the House of Representatives. He reversed his position and said that nobody had to wait for the creation of ERDA to move forward with the demonstration program. But he stood firm on favoring NSF as the "lead agency" for solar research, and said that a full transfer of these activities to NASA "could delay the already established solar energy program."

A TALK WITH OMB

Teague decided it was time for a heart-to-heart talk with Ash, preferably with senior committee members present. To set the stage

for a meeting between the subcommittee chairmen and ranking minority members and Ash and his aides, Teague wrote the OMB Director a four-page letter on March 18, 1974. The letter detailed in an inquiring and objective fashion a large number of questions of basic interpretation necessary before the committee tackled the NASA and NSF authorization bills. There were questions like how far should NASA go in developing energy technology, what should be the ratio between applied and basic research in NASA, and how far toward development and demonstration should NSF take its support of applied research projects. Teague opened up the issue of solar energy R. & D. beyond heating and cooling—including solar thermal, wind energy, bio-conversion, ocean thermal and photovoltaics. He argued:

NSF, to my knowledge, did not request this money or responsibility originally from OMB. It was an add-on, evidently ordered by OMB. NSF has little experience for handling applied research, demonstration projects, prototype development, etc. In fact, it has no statutory authority for doing *any* development. * * * NASA *does* have the managerial, as well as both scientific and technological expertise to handle the programs—plus existing equipment and facilities. * * * Satellite solar power is a space program in itself, and is not presently funded.

It was an unusual meeting. Although everybody assembled in the main committee room and there was a reporter with a stenotype making a record, it was not labelled an "executive session." It was given the simple title of "informal meeting"—perhaps so the committee could claim at the end of Congress that all its meetings and hearings had been open. Yet for the purposes of absolutely frank discussion, it could not have been otherwise. The meeting lasted for over two hours, with Ash staying for the first thirty minutes, and his assistants Frank Zarb and William McCormick filling in after his departure.

The following senior committee members made observations and asked questions during the historic March 20 meeting with OMB: Teague, Mosher, Hechler, Davis, Wydler, Bell, Fuqua, Winn, McCormack, Frey and Cronin. Ash once again defended NSF as the logical spot to handle solar research activity, because "there is no ERDA (and) NSF does have a running start." McCormack rebutted that the issue had been discussed for weeks in his subcommittee and full committee, concluding:

When you get to the point you need a demonstration program, NSF is simply not constituted either by its organizational structure or by its management to carry the program out. This is exactly where we broke away from your budget proposals and said that if you are going to get the job done, instead of just carrying on endless research, if you are going to solve the energy problem, we have to put this particular program someplace where there is competent management, personnel, mission-oriented organization to carry it forward. * * * Roy, I think that if I may in all sincerity and with complete respect suggest that in all of your thinking about this

question, you still do not understand what our solar energy bill is. And I think you think of it as some sort of a research and development program which it clearly is not. It is a demonstration program. It is to put 4,000 solar units out in the field in people's houses, in 4,000 buildings all over this country on Federal and private land and houses, and factories and schools and Federal buildings and everything else, to run for five years. * * * What this country needs is a demonstration program, not a R. & D. program.

THE MEANING OF "PROOF OF CONCEPT"

Ash responded that he did not feel NASA was geared toward demonstration-type programs, and that it wasn't an open and shut case. Zarb commented as they came to the close of the session that he sensed a lack of a good working relationship with the committee, particularly since there appeared to be differences of opinion over the definition and full meaning of the phrase "proof of concept." Zarb invited members of the staff to come over to the OMB office to continue the discussion. Two days later, Swigert, Yeager, Hammill, Ratchford, and Wells trooped over to the New Executive Office Building where they went deeper into detail on some of the issues raised in Teague's March 18 letter. One reaction obtained was that OMB agreed that NASA should be the lead agency for a "program definition" study of a solar satellite system and that OMB would not object if the committee wished to include any funding authorization for such a NASA study. But they again stood firm against transferring funds from NSF to NASA for solar research programs. "Let's not rock the boat because ERDA is going to be established soon" was the OMB conclusion.

After a meeting which lasted three hours, a committee staff member concluded a memorandum on the meeting by stating:

The meeting concluded at 12:30 and hopefully marked a new era of cooperation between OMB and committee staff.

Unfortunately, his optimism ran away with him.

At the initiative of the committee, the conference report and final version of the NSF authorization bill passed in 1974 included a provision requiring NSF prior to undertaking any heating and cooling or other solar energy programs to coordinate with NASA and report the full details within 90 days to the Science Committee and the comparable Senate Committee. NSF was also directed to coordinate any solar energy program with the academic community and private industry. The NASA authorization conference report in 1974 stipulated that NASA "should apply added resources to its energy research and development activities, including the solar satellite power station study."

COAL-RELATED RESEARCH

The NASA Conference Report in 1974 also included a \$3.9 million provision inserted by Hechler during the House floor debate on the authorization bill, for the expansion of coal-related research already being carried out by NASA. As he pointed out when introducing his amendment, NASA's Lewis Research Center in developing more efficient, high-temperature combustion techniques had also done some work in more efficient coal combustion. Better fire control techniques and fire-resistant materials developed following the 1967 Apollo fire were also transferable in suppressing mine fires. Hydrocarbon detectors used for detecting hydrogen leaks in launch vehicles were investigated by NASA for use in detecting methane in coal mines. Although the Senate supported this initiative in expanding NASA's work in coal research, some difficulties were encountered with persuading the House Appropriations Committee which at that time was seeking to concentrate coal-related research in the new ERDA organization. In later years, Teague many times mentioned that he felt this Nation would have made far more progress in meeting energy needs had NASA been given a larger role in the energy picture.

THE OMNIBUS SOLAR BILL

In addition to the solar heating and cooling bill, the McCormack subcommittee also produced another solar bill which was enacted—the "Solar Energy Research, Development, and Demonstration Act of 1974." This second piece of legislation established a Solar Energy Research Institute, provided for the development of suitable incentives to assure the rapid commercialization of solar energy, and spurred the conduct of research, development and demonstration of solar energy technologies. The subcommittee worked with the Office of Legislative Counsel to devise a definition of solar energy which would include everything except fossil fuels developed with the help of the sun. The key word used was "recently", as solar energy was defined to encompass "energy which has recently originated in the sun." This excluded long-term items like fossil fuels, but included direct and indirect solar radiation and intermediate solar forms such as wind energy, bioconversion (conversion of organic wastes to fuels), photovoltaics (solar cells) and the generation of electricity from ocean thermal gradients.

The subcommittee worked throughout 1973 and during 1974 up through July drafting, revising, testing, holding hearings and assembling expert testimony in this fast-developing area. Finally, on August 9 the completed bill was brought before the subcommittee for

its markup session. McCormack made quite a point of the fact that the 1974 testimony from the executive was "very constructive and very helpful." He elaborated:

As you will recall, contrary to our experience with previous bills, the Administration came in and endorsed this bill and supported it with some very specific and constructive recommendations, all of which have been adopted in the modifications of the bill.

The events which surrounded the administration support for this omnibus solar bill are in themselves a fascinating drama, the actors in which would no doubt relate different accounts from their own perspectives. In November 1973 in an effort to protect the jurisdiction of the Science Committee, Teague introduced two different versions of the "National Energy Research and Development Policy Act of 1973" which was being sponsored in the Senate by Senator Henry Jackson (Democrat of Washington). One version covered geothermal energy and the second was devoted to other energy sources. Teague was disturbed that Lewis Deschler, the House Parliamentarian, had referred these bills to the Interior Committee instead of the Science Committee, and he argued at length with both Deschler and Speaker Albert that these bills belonged in the Science Committee. Teague also wrote detailed arguments to both the Speaker and Parliamentarian. He contended that the energy R. & D. authority being exercised by NSF, NASA and the National Bureau of Standards, plus the additional authority given to the NSF Director after the abolition of the Office of Science and Technology, justified referring the bills to the Science Committee which had jurisdiction over these officials.

DEFENDING JURISDICTION OVER ENERGY

From that point forward, the Science Committee watched very closely as Senator Jackson's bill was passed in the Senate and started through the House Interior Committee. It was decided to fight the House Interior Committee bill before the House Rules Committee on the grounds that it violated the jurisdiction of the Science Committee. The Interior bill, sponsored by Representative Morris Udall (Democrat of Arizona) was called the Federal Nonnuclear Energy Research and Development Act. On July 15, 1974, Teague wrote a letter to every member of the Rules Committee informing them:

The bill proposes to authorize funds in eight areas, including solar, geothermal energy, wind energy, hydrogen (which is not an energy source at all) and basic research and development. All of these areas of technology clearly lie within the jurisdiction of the Committee on Science and Astronautics. Thus the bill constitutes an infringement of the jurisdiction of the Committee on Science and Astronautics.

Teague asked the Rules Committee to defer action on the Udall bill. A passel of Science Committee members trooped over to the Rules Com-

mittee hearings, both Democratic and Republican members testifying en masse against the Udall bill. Result: the Rules Committee voted down a rule.

Senator Jackson was highly displeased with this action which bottled up the companion version of his bill in the House. He signaled that he was going to hold up legislation to establish ERDA until such time as there was action on the Udall bill. When the administration got this message, frantic efforts started to see if the all-out opposition to the Udall bill by the Science Committee could be swung around. The administration was counting on the establishment of ERDA as the most vital part of its energy program.

"I WANT TO MAKE A DEAL"

Not long after the Rules Committee had killed a rule on the Udall bill, McCormack's subcommittee started hearings on July 30 on the omnibus solar research bill. Administration witnesses, including John C. Sawhill, Administrator of the Federal Energy Administration, voiced their opposition. Frank Zarb, Associate Director of OMB, was due to testify next. Accompanied by William McCormick, Zarb asked to come up and confer with Teague, McCormack, Mosher, and several other committee members. According to Dr. Ratchford, who was present, this is what happened:

Zarb came in. He was very direct and said in effect: "I want to make a deal. We very much want to get the Energy Reorganization Act—that's the centerpiece of our energy strategy. If you will take steps to get Mr. Jackson's bill through the House, to get it back on track—that is cut a deal with Mr. Udall—the Administration will in turn support the solar heating and cooling bill, the geothermal bill and the bill I'm supposed to testify on tomorrow."

The deal was made.

It was agreed that a compromise would be worked out with Udall, and Zarb would testify in support of the omnibus solar bill. When Dr. Ratchford returned to his office, he received a phone call from a committee alumnus, Joseph Del Riego, who by that time was handling congressional relations for NASA. Del Riego, according to Dr. Ratchford said:

I want to apologize. We just sent up the written version of our testimony on the bill tomorrow. The OMB made us oppose it, although we would love to support it.

Dr. Ratchford answered:

Well, Joe, you may be hearing a little bit later.

Sure enough, Del Riego phoned back and said:

You won't believe what happened. OMB has changed its position, and we are going to have to rewrite the conclusion in our testimony. We have already sent copies. Can you send all of them back?

Zarb opened his testimony before the committee as follows:

I am particularly pleased this morning to be able to say that we generally support the bill about which we are here to testify. It is all too frequent that we must come before a microphone and start off by saying we have some grave problems. But we do generally support the bill and its intent and motivations, and certainly the project that it addresses.

THE QUICK COMPROMISE WITH UDALL

The other side of the deal was consummated as Teague gave instructions to the staff to work with Udall's staff and arrive at a compromise on the Udall bill. It was agreed that no jurisdictional decisions would be written into the bill, that it would be comanaged on the House floor by members of both the Science and Interior Committees, and that members of both committees would serve in the conference with the Senate.

By August 13, Representative James A. Haley (Democrat of Florida), Chairman of the House Interior Committee, was able to write to Teague:

I am pleased to learn that Mo Udall and Mike McCormack and their staffs have reached an agreeable compromise on H.R. 13565, the Nonnuclear Energy Research and Development Act of 1974. Mo has discussed the various elements of the agreement with me, and I find it satisfactory, as I understand it is with you. * * *

It was gratifying to me that our two committees have been able to work together in this constructive manner, and I am looking forward to swift passage of this important legislation.

The compromise bill presented a unique parliamentary situation. The text of the compromise was printed in the Congressional Record. The Committee on Rules then made in order, not a regular bill in printed form, but the text as printed in the Congressional Record, a precedent which was later repeated in the consideration of loan guarantees for synthetic fuels in 1976 (see chapter XVII).

The process by which the administration came around to supporting the three subcommittee bills was characterized by Dr. Ratchford as a response to "the power of negative thinking."

As these events were taking place, the subcommittee met on August 9 to mark up the omnibus solar research bill. At the conclusion of the subcommittee markup session, Symington turned to Chairman McCormack and said:

I do not know whether any of us were here when the Science Committee was created. They wrote better than they knew. They did hit the Moon inside of 10 years, and it was a heck of a gamble with a tremendous amount of insight and hope. I just want you to know that I as a member of this committee am very proud of your leadership in setting up this kind of legislation which perhaps in ten years' time will bring an even greater benefit to this country and mankind once we unleash the scientific

forces. I commend you for your initiative. I am grateful to be serving with you on this committee.

Goldwater, who along with McCormack, Teague, and Mosher cosponsored the principal bill, spoke out strongly for its passage when the full committee markup session occurred on August 15, 1974.

GETTING ON BOARD FOR SOLAR ENERGY

When the magic day arrived for the House to debate the bill, the scene was reminiscent of the solar heating and cooling bill—there was a wild rush to get on board. The earlier bill dealt with short-term applications, while the bill the House debated on September 18, 1974, established a structure for more long-range utilization of various forms of solar energy. It took two days for the House to finish action on the bill. Many Members wanted to say their piece and praise the national implications as well as the local applications. Also, McCormack's congressional primary was on September 18, and Teague wanted to give him a chance to return and speak on his bill. When the roll was called on September 19, no House Member had arisen to speak against the bill and it passed by a 383-3 margin.

The Senate passed a somewhat similar bill, but was considerably more liberal in authorizing \$100 million instead of the modest \$2 million provided in the House bill. The final version compromised on \$75 million.

THE GEOTHERMAL BILL

Work by the subcommittee on the Geothermal Energy Research, Development, and Demonstration Act of 1974 started in 1973. It was preceded by the background data in the 1972 task force report on energy, which concluded that geothermal energy should have greatly increased R. & D. emphasis. The first geothermal bill introduced in 1973 was tailored by Representative Sam Steiger (Republican of Arizona) to be referred to the House Interior Committee, based on the work already being done by the Department of Interior, primarily through the U.S. Geological Survey. Brown then introduced a bill in June, followed by a McCormack bill in October, both of which made use of the technique of drawing in the National Science Foundation so their bills went to the Science Committee. Brown and McCormack rounded up 90 cosponsors and merged their bills.

As they got ready to hold hearings on geothermal energy, scheduled for early in 1974, McCormack asked Teague to see if the committee could draft former astronaut and future U.S. Senator, Dr. Harrison "Jack" Schmitt, a geologist, to help on the bill. Dr. Schmitt had already been pegged to become NASA's energy expert. When Teague wrote to Dr. Fletcher on November 29, 1973, he stated:

The disciplines touched by this bill fit well into the background and experience of Astronaut Jack Schmitt. Accordingly, I would like to explore the possibility of securing, on a part-time basis, his help on this bill. His schedule could be made relatively flexible so as to interfere least with his other duties.

I believe his help in identifying and securing the best witnesses, in analyzing their testimony and his recommendations for the mark-up of the bill would be of great value both to NASA and this committee.

Unfortunately, Dr. Schmitt was already deeply committed to his new job as Special Assistant to the Administrator for Energy Research and Development.

In drafting the geothermal bill, the subcommittee stayed closely in touch with the Senate Interior Committee which was at the same time developing parallel legislation. The aim was to reach agreement in advance on the major thrust of the legislation in order to avoid some of the protracted conference fights which had occurred on other legislation. As with the solar bills, a provision was included to transfer the geothermal research apparatus to ERDA or a similar Federal agency by the time it was established. Meanwhile, NSF and NASA were given authority in the area through a geothermal energy coordination and management project. Loan guarantees, which excited so much interest and opposition in subsequent years, were provided for in the geothermal bill—up to \$25 million for any single project and up to \$50 million for any combination of loans to any single borrower.

"INFORMAL CLOSED MEETING"

On April 10, 1974, the Subcommittee on Energy assembled in room 2318 at 9:30 a.m., in order to discuss the current status of the geothermal bill. The doors were closed, and the public was not admitted to the meeting, nor was the press or any outsiders. The officially printed record states that the Subcommittee on Energy held 47 open meetings and zero executive sessions during the 93d Congress. How was it possible to achieve this 100-percent open meeting record? Here's how:

McCormack opened the meeting by stating:

This is not a meeting. It is an informal assembly, is that correct?

McCormack's inquiry was immediately answered by Dr. Ratchford: "That is correct." McCormack then added:

Or discussion group, and we are keeping the record for our own personal purposes only. Now, the purpose of the discussion this morning is to review with the members of the subcommittee a proposed new version of the geothermal bill that we all co-sponsored as H.R. 11212.

One of the recurring themes throughout all the testimony received, starting with Congressman Rhodes and Congressman Ullman, was that the bill should be a much more comprehensive bill than the one we wrote which selected demonstration programs for hot rock formations and for geopressured zones.

The meeting itself arrived at general agreement that the concept of the geothermal bill would be broadened.

During the subcommittee markup session, McCormack, Mosher, and Brown all called attention to the need for additional support to train personnel in geothermal technology. McCormack stated:

The testimony that we have received and the consultation we have received indicates that manpower may well be the limiting factor in developing geothermal energy. (We are) setting out a policy and authorizing and encouraging NSF to undertake a much more aggressive program for training and retraining personnel.

Brown and Mosher added that because of the declining support NSF was giving to educational programs, it was necessary to beef up this section of the legislation, which was done.

When the bill reached the House floor on July 10, Brown mentioned that "we are in a period of relative chaos in the organization of our energy research and development activities, and what this bill proposes is an innovative concept to bridge the interim period until we can resolve this chaos." He added:

The administration has not been wholeheartedly in support of this legislation, not because it does not agree with the goal but because it has not formulated and put into effect its own program.

REPUBLICAN SUPPORT FOR GEOTHERMAL ENERGY

Goldwater, in speaking out for the bill, indicated that it had been reported unanimously "and has the complete support of the Republican members of the committee." He indicated that it was possible for geothermal energy to supply as much as 20 percent of the Nation's electric power by the year 2000. Mosher correctly noted that the cosponsors of the legislation "almost read like a list of 'Who's Who' in the House of Representatives." As with the solar energy legislation which came out of the subcommittee, there were paeans of praise from all sections of the country as Member after Member arose to praise the bill.

Two amendments by Hechler were rejected—one to omit the section providing for Federal disposal of geothermal projects after the demonstrations had been completed, and the second to confine the loan guarantees to small business. The latter amendment was labeled as "well meaning but mischievous" by Holifield. Goldwater and McCormack pointed out that only large utilities and city governments would be capable of undertaking the geothermal demonstration projects. An amendment by Victor Veysey (Republican of California) to encourage a clearinghouse of Federal, State and local rules and regulations as applied to geothermal projects was adopted. The bill itself then passed by the thundering majority of 404 to 3.

No difficulty was had when the House and Senate conferees worked out the minor differences in the Senate and House-passed bills. Mosher suggested in a House floor speech that "the few adjustments that have been made are more cosmetic than substantive."

All three pieces of legislation which the subcommittee produced—solar heating and cooling; solar energy research, development and demonstration; and geothermal energy research, development and demonstration were put together while President Nixon was in office, and were eventually signed by President Ford in September and October 1974.

INFLUENCE OF SUBCOMMITTEE ON ENERGY

In addition to its many other activities already mentioned, the Subcommittee on Energy took the initiative in a number of other areas. On November 20, 1973, a one-day hearing was staged in Los Angeles on "Research and Development and the Energy Crisis." The subcommittee held three days of hearings in May 1974 to probe the status and future of the development and utilization of oil shale resources; a report was also published on "Energy from Oil Shale: Technical, Environmental, Economic, Legislative and Policy Aspects of an Undeveloped Energy Source." In 1974, the subcommittee published a report prepared by the Science Policy Research Division on "Energy from United States and Canadian Tar Sands."

In May 1974 the subcommittee held a one-day hearing to review the status of research in the utilization of wind energy. Later in the same month, the subcommittee broadened its review of solar energy technologies in a one-day hearing on the use of ocean thermal gradients to produce power or useful byproducts—a particular interest of Frey. A one-day hearing in June dealt with bioconversion, and two days in the same month were concentrated on solar photovoltaic energy—the direct conversion of sunlight to electrical energy. Among other studies published by the subcommittee, many with the assistance of the Science Policy Research Division, were "Conservation and Efficient Use of Energy," "Secondary and Tertiary Recovery of Oil," "Federal Energy Legislation," and a voluminous 2,680-page compendium entitled "Inventory of Energy R. & D.," which was prepared for the Subcommittee on Energy by the Oak Ridge National Laboratory of the Atomic Energy Commission with the support of the National Science Foundation. This publication was an update of the March 1972 inventory published by the subcommittee, and McCormack characterized it in this way:

It is probably the most useful document available for answering the question of "What are we doing now in energy R. & D.?"

The Subcommittee on Energy officially passed out of existence at the end of the 93d Congress on January 3, 1975. Right down to the wire, the subcommittee continued its high-paced activity. During the week before Christmas, on December 17, 1974, McCormack scheduled the last hearing of the subcommittee to consider the Synthetic Liquid Fuel Research and Development Act of 1974. This legislation was introduced by Teague and Representative Carl D. Perkins (Democrat of Kentucky). Teague advised Perkins that by authorizing the National Science Foundation to initiate synthetic fuels R. & D., he could get the bill referred to the Science Committee and thereby insure that Perkins would get a hearing. The Subcommittee on Science, Research and Development joined the McCormack subcommittee in sponsoring the hearings.

Long before the McCormack subcommittee finished its work at the close of 1974, both McCormack and the Energy Subcommittee had solidly established the expertise of the full committee in the eyes of the Congress. The three major pieces of legislation enacted through the direct initiative of the subcommittee were in themselves great milestones of achievement. They also materially assisted in bolstering the argument that the jurisdiction of the full committee should be expanded and clarified to include energy research and development. The endorsement by the House of Representatives of these and other new challenges to the committee are the subject of the next chapter.



Representative John F. Seiberling (Democrat of Ohio), a member of the task force on energy.



Representative J. J. Pickle (Democrat of Texas), who served on the Subcommittee on Energy.

RULES OF THE HOUSE OF REPRESENTATIVES

* * * * *

RULE X

PARAGRAPH 687(r)

Committee on Science and Technology

- (1) Astronautical research and development, including resources, personnel, equipment, and facilities.
- (2) Bureau of Standards, standardization of weights and measures and the metric system.
- (3) National Aeronautics and Space Administration.
- (4) National Aeronautics and Space Council.
- (5) National Science Foundation.
- (6) Outer space, including exploration and control thereof.
- (7) Science Scholarships.
- (8) Scientific research and development.
- (9) Civil aviation research and development.
- (10) Environmental research and development.
- (11) All energy research and development.
- (12) National Weather Service.

In addition to its legislative jurisdiction under the preceding provisions of this paragraph (and its general oversight function under clause 2(b)(1)), the committee shall have the special oversight functions provided for in clause 3(f) with respect to all non-military research and development.

* * * * *

PARAGRAPH 694(f)

The Committee on Science and Technology shall have the function of reviewing and studying, on a continuing basis, all laws, programs, and Government activities dealing with or involving non-military research and development.

Committee Jurisdiction Commencing in 1975
(Jurisdiction over nuclear R. & D. added in 1977)

A New Name and Expanded Authority for the Committee

The Science and Astronautics Committee was initially established as a major committee, as part of the plan hatched to insure that Representative Overton Brooks would transfer from the Armed Services Committee to become the first chairman of the Science Committee (see page 15). With a broader jurisdiction than the comparable Senate committee, the House committee nevertheless experienced some difficulty in attracting Members with interests outside of space and science. The turnover in committee membership became unusually large, as many Members sought to be on those committees which helped their own districts to a greater extent. This was especially true after the Moon landing in 1969, as it became apparent that the decline in the space program might mean a decline in the significance of the Science Committee.

As chairman, Brooks did a remarkable job in preserving and even extending the jurisdictional frontiers of the committee. He successfully fended off numerous attempts by other committees, notably Armed Services and Interstate and Foreign Commerce, to hem in the scope of Science Committee activities. Miller, who had greater prestige among his colleagues, did not go out of his way to expand jurisdiction and thereby create conflict. Both Brooks and Miller were well protected at the highest levels of the House by the membership of two successive Speakers, McCormack and Albert, on the committee at the time each served as House majority leader. In 1963, Miller moved positively to strengthen the jurisdiction of the committee through the establishment of the Daddario Subcommittee on Science, Research and Development. By the end of the decade the committee had authorization power over the National Science Foundation, but the power to authorize the funding of the National Bureau of Standards did not get asserted until the 1970's.

Aside from his brilliant initiative in establishing the new Science Subcommittee, and his imaginative utilization of panels of distinguished scientists, Miller's greatest contribution toward expanding the power and influence of the committee came in the international area. This was done primarily through international visits and his somewhat reluctant consent to adopt Fulton's recommendation to set up a special Subcommittee on International Cooperation in Science and Space (see chapter X).

MONRONEY-MADDEN JOINT COMMITTEE

In the mid-1960's, there was a good chance to broaden the committee's jurisdiction which lacked only the leadership of the committee to capitalize on it. Speaker McCormack appointed Hechler as one of the three House Democrats on the Monroney-Madden Joint Committee on the Organization of Congress in 1965. Working from the inside, Hechler had frequent opportunities to enhance the prestige, defend the good reputation, and even broaden the committee's jurisdiction. For example, when Senator Proxmire suggested that space was simply a matter of communication and transportation and should be merged with the Commerce Committee, Hechler responded:

Being a member of the House Committee on Science and Astronautics, our committee handles a good deal more than "communication and transportation." We deal with the entire spectrum of scientific research and development, and building of the scientific strength of the Nation.

Occasionally, coaxing questions to witnesses produced good results, as when Hechler asked the Director of the Budget, Charles L. Schultze how he would characterize the relationships between Congress and the scientific community. Schultze responded:

The recent hearings of Chairman Daddario's subcommittee of the House Committee on Science and Astronautics on the National Science Foundation evidenced mutual respect between the legislator and the scientist, no doubt based on some mutual education in recent years.

Despite discreet proddings, Miller did not recognize the advantage of this great forum for building the strength of the committee. Only two committee members testified before the joint committee, Wydler and Rumsfeld. Wydler advocated application to Congress of many of the computerized techniques developed in NASA. Beyond that, he and Rumsfeld also zeroed in on the desperate need for more staff on the Science Committee and particularly staff assigned to the minority. It is unfortunate that the type of organized effort utilized in 1973 in connection with the Bolling committee was not also put forward in 1965.

THE LOST OPPORTUNITY

The final report of the joint committee recommended that the jurisdiction of the Science and Astronautics Committee be broadened to include "jurisdiction over environmental sciences." Hechler was able to persuade the joint committee to include this language in its final report in 1966:

Science and engineering have acquired in recent decades a crucial importance in governmental affairs. They influence and help shape not only our national security policies but a broad range of domestic and international public policies as well.

Congress now authorizes and appropriates over \$15 billion annually for scientific research and development. It is also faced with the task of monitoring a complex array of 42 technical programs that cross agency lines.

At present, no single committee in either House has comprehensive and coordinating jurisdiction over these activities. * * * We therefore recommend that the committee in each House that now most nearly approaches such concentration have its present jurisdiction expanded to encompass the necessary coordination.

At this point, once again the Science Committee lost its opportunity. There was no rallying of the troops, and in fact there was sheer apathy toward the recommendation of the joint committee on the part of the Science Committee. Soon other committees began to object to any action to change committee jurisdictions. The report gathered dust. The Committee on Rules did not act because there was simply not enough pressure to act. Finally, the Rules Committee decided to hold hearings in 1970 on a stripped-down version of the 1966 recommendations. Here again, the Science Committee leadership neither testified nor seemed to express any interest. Perhaps the Rules Committee would have smothered such an effort, yet there were those who felt at the time that the effort was at least worth a try.

EXODUS FROM THE COMMITTEE

In 1970 and 1971, the first effects of the impending decline in space funding and space interests began to be felt. The younger members of the committee began to look for greener pastures—committees which could produce more direct benefits for their districts. At the close of the 91st Congress in 1970, the Democratic side of the committee was hit with a wave of resignations. Daddario left to run for Governor of Connecticut, and Brown went off to try for the Senate in California; seven other members voluntarily left to join other committees. This meant that out of the 18 Democrats on the committee in 1970, only nine opted to be assigned to the committee in 1971.

For Miller and Teague, this represented a crisis in the life of the committee. As chairman of the Veterans' Affairs Committee, Teague had frequently discussed with Speaker Rayburn the problem of keeping good Members on that committee, which Teague realized could only be done if they were allowed to serve at the same time on other committees. Since the caucus rules permitted service on only one major committee, the status of the Science Committee as a "major committee" was effectively preventing some Members from serving on any other committee. This issue, of course, cut both ways: Changing the Science Committee to a nonmajor committee would enable more good Members to bid for assignment, but at the same time it seemed to reduce the prestige of the committee.

The entire issue came to a head at the start of the 92d Congress in 1971. Symington, going into his second term in the House, had made his mark as an active participant in committee affairs. Genial, cooperative, imaginative, with a sharp sense of humor, one of the two father-and-son teams in the Congress (Symington and Goldwater, whose fathers were both in the Senate), Symington had a high standing in the scientific community as well. Symington mentioned to Dr. William D. McElroy, Director of the National Science Foundation, that he had been offered a vacancy on the House Interstate and Foreign Commerce Committee. Symington told Dr. McElroy that he probably would have to leave the Science Committee because of the Democratic caucus rule which prohibited him from serving on more than one major committee. In an unusual gesture of support for a Congressman who sat on the other side of the witness table during NSF hearings by the Subcommittee on Science, Research and Development of which Symington was a member, Dr. McElroy mentioned to Miller and Davis how unfortunate it would be if the rules prevented Symington from continuing on the Science Committee. Since Interstate and Foreign Commerce gave Symington the leverage he needed in his home district in Missouri, he was prepared to leave the Science Committee.

HOW THE COMMITTEE BECAME "NONMAJOR"

What subsequently transpired is very clear: The Science Committee in 1971 was redesignated as a nonmajor committee and Symington was able to serve on both committees of his choice. Exactly how and precisely when this deed was accomplished has been lost in the fading memory of the participants, and the lack of precise documentation. Speaker McCormack, who relinquished his office at the end of 1970, and Speaker Albert, who took office in 1971, both served on the Science Committee and did not in 1978 recollect the move. Neither the chairman of the Ways and Means Committee (Representative Wilbur D. Mills—Democrat of Arkansas) nor his staff director, John M. Martin, Jr., recall the circumstances, although Chairman Mills remembers it was done to accommodate one of the Members who wished to serve on two committees. Neither the Parliamentarian's Office, the Democratic Steering and Policy Committee (which inherited from the Ways and Means Committee the power to recommend committee designations and assignments) nor the Democratic caucus have a record of how it happened. Nor do Miller or Teague recall the precise chain of events which caused the redesignation of the committee.

One senior subcommittee chairman, Karth, has a very vivid recollection of his reaction to the move. Karth was furious that Miller, as

chairman, did not put up a fight against making the committee "non-major." This one of the reasons that Karth gave for leaving the committee to join the Ways and Means Committee in October 1971. Karth reflected:

I don't think that a chairman accepts those things without first going back to his committee and saying: "This is what the leadership is talking about, and I want to discuss it with you because you're affected as much as I am and probably more." But he didn't do that. * * * I didn't think that the Chairman should just accept it without saying anything.

BOLLING COMMITTEE HEARINGS

On May 2, 1973, the House Select Committee on Committees, popularly known as the Bolling committee, started its six weeks of public hearings prior to recommending major jurisdictional and other reforms in the House. Even before the hearings started, Teague and his staff director, Jack Swigert, had huddled on the strategy to use in preparing for a major presentation to the Bolling committee. Swigert introduced the subject at several of his weekly staff meetings, stressing that he wanted ideas, suggestions and input for several different approaches, ranging from a single appearance by Teague to separate presentations by the subcommittee chairmen. Dr. Holmfeld was assigned to monitor the hearings, and he made periodic reports on the nature of the presentations, the types of questions being raised by the committee as witnesses appeared, and the particularly effective techniques being used by witnesses. For example, Dr. Holmfeld reported that the testimony of Representative Albert H. Quie (Republican of Minnesota) had been well received. Swigert forthwith forwarded copies of Quie's statement to all his task team leaders with this note:

A good example in the use of appendices for historical information and material for the record. We are going to need devices like this, or other innovations, to cover the spectrum of the committee's areas of interest with the depth needed.

Initially, it was planned to divide up the 60 minutes of testimony time allocated to the committee with several minutes for each subcommittee. In a memorandum to the staff, Swigert indicated:

The objective of the staff will be to prepare this testimony so that it is the most concise, factual and with the most depth of any testimony presented yet to the committee.

In this fashion, a whole sheaf of valuable material was assembled, specifying the work and future capabilities of the committee. Jack Kratchman, detailed to the committee from the National Science Foundation, prepared a voluminous report analyzing current and possible future energy jurisdiction options for the Congress. All of this

material was then used with telling effect to bolster the complete and persuasive testimony which was subsequently delivered by Teague and Mike McCormack on June 8. Originally scheduled for May 11, Teague and McCormack decided to wait until the last day of the first phase of the hearings so their combined testimony could be fully assembled and have a greater impact. From the standpoint of committee influence, this developed into better strategy because it enabled Davis and Mosher to present their case on May 11, followed by Cronin, Pickle, and Ketchum who appeared later in May.

DAVIS AND MOSHER TESTIMONY

Both Davis and Mosher called attention to the wide range of activities and accomplishments of the Science Committee. They also quoted House Minority Leader Ford, who a few days before had mentioned he was in on the creation of the Science Committee, and had stated:

With our space program now more or less stabilized, it seems to me that this committee could justifiably be given additional responsibility.

Representative Dave Martin (Republican of Nebraska), vice chairman of the Bolling committee, asked Mosher: "Do you have any specific suggestions, Charlie, as to additional jurisdiction that you do not now have?" Mosher responded:

John Davis had the temerity to suggest that NOAA might come within the purview of the Science Committee. It happens that I am the ranking Republican on the Subcommittee on Oceanography of the Merchant Marine Committee and sort of grandparent of NOAA in many ways and so that puts me in the middle. However, it is true that NOAA is an agency which, I think, has great potential as precisely the type of agency that could well be assigned to the Science Committee.

Both Davis and Mosher elaborated on the new work which McCormack's task force and Subcommittee on Energy had done, and Mosher advised: "We do have the capacity, the interest, and the willingness to accept added responsibilities."

TEAGUE AND MCCORMACK TEAM UP

Because of the rising importance of energy in the work of the committee, Teague and McCormack decided to testify in tandem on June 8, 1973. The stack of supporting documents which they presented to the Bolling committee was so impressive that Bolling observed at the outset:

Mr. Teague, I have had the chance to read your statement. I know how much effort has gone into it and many other documents that were submitted. We are very

grateful to you and the staff for taking it seriously. * * * These are very extensive documents and are very helpful to us, as you know, in terms of specific approaches of your committee and other committees related to it. But in terms of the general problem, we truly are grateful for the very creative and constructive efforts that you have made.

As Teague got ready to begin his statement, Bolling also gave him credit as one of the original backers of the reorganization idea:

When the Speaker talked to me first about the idea of this, he mentioned you and a few others who felt that we needed to do something very badly about reorganizing, looking at the problem of committee structure. So, in a sense, you are one of the parents of this committee.

Teague mentioned that he wanted McCormack to testify along with him because of the importance of energy. This was the main thrust of his testimony, aside from detailing the principal achievements of the committee. He spoke broadly, not parochially, focusing on issues of national concern. Teague advocated distributing committee workloads more evenly, providing for joint referrals to minimize future jurisdictional conflicts, and clarifying responsibilities. He sketched in the rigorous oversight which his committee had accomplished in high technology areas. Making a telling point concerning the 2½-year study of civil aviation research and development, Teague added:

Our committee has been the only congressional unit to hold hearings on this study's conclusions and recommendations even though the problem areas identified extended across multiple committee jurisdictions: Armed Services, Banking and Currency, Interstate and Foreign Commerce, Joint Economic Committee, Judiciary, and Ways and Means. Civil aeronautical research and development should be concentrated in a single committee, if we are to legislate effectively in the aeronautical field.

Teague wove a very evenly meshed pattern of the relationships between health research and development and other forms of scientific R. & D., the importance of patent policy decisions in translating research results into useful technology, and the growing importance of technology assessment. He raised new questions: The relations of computers to privacy, the ethical and moral implications of genetic engineering, the proper balance between energy and environmental research, finally leading into the qualifications of McCormack in the energy area:

Two years ago, when Mike was a freshman, Chairman George Miller of this committee appointed Mike chairman of a task force on energy. The task force did a splendid job, and this year we upgraded it to a full Subcommittee on Energy, and made Mike its chairman. I think we are fortunate to have scientists of Mike McCor-

mack's caliber and dedication available to chair such an important subcommittee at this time.

MCCORMACK AND ENERGY

McCormack led into his testimony by describing the energy crisis, and commenting that this had produced a crisis within Congress in organizing to meet it. He pointed out how fragmented authority, dispersed among many committees, had produced confusion and impotence in the legislative branch. He stated that there was no integrated team of top flight scientists, engineers, economists and other specialists working as a unit to tackle the energy crisis. McCormack characterized the response of Congress "insipid," and blamed the nature of the response on the diffused committee structure. He was not bashful in his prescription:

I believe that these responsibilities logically fall to the Committee on Science and Astronautics. This committee has established a tradition of dealing with technological problems, and of doing so in a scientific manner.

To bolster his argument, McCormack even drew on the example of the defunct Panel on Science and Technology, which had not met for over a year and which Teague apparently had no intention of reviving. He then presented 52 tightly drawn printed pages of analysis which supported his arguments. The analysis went into deep detail on the current House committee system for energy matters, assessments of that system from the standpoint of efficiency, output, and other criteria of operation, and a complete evaluation of existing committee jurisdictions pertaining to energy. There was included an identification and evaluation of alternative jurisdictional systems, along with carefully presented interpretations and conclusions. From the hearings and reports of the various House committees, charts were prepared indicating their interests and output in relation to various sources of energy, and why a more centralized jurisdiction made sense. He described the work of his Energy Subcommittee as "constructive, deliberate, sincere, not excessive publicity, and nonpartisan." Much of McCormack's material was drawn from the study which Kratchman had produced while detailed to the committee from the National Science Foundation.

Teague then wound up the presentation with a challenge that "the House of Representatives must be ready to respond with timely and effective legislation and vigilant oversight."

The questions were sympathetic, from Bolling, Martin, and other Members. The main thrust of the questions was on oversight, and Teague pointed out the "absence of scandals and overruns" in the space program as an illustration of the value of oversight. Bolling offered a nostalgic reminder of the committee chaired by Teague, on which Bolling has served, which had reviewed the operation of the G.I. Bill of Rights: "That certainly was an oversight operation."

DR. SEAMANS SUPPORTS SCIENCE COMMITTEE

Following the completion of the first phase of the hearings, the Bolling committee turned to panels of experts, political scientists, and outside analysts and observers for advice and assessments. Dr. Robert C. Seamans, Jr., President of the National Academy of Engineering and former Deputy Administrator of NASA, told the Bolling committee:

From my own experience in the fields of research and development, I think we have been very fortunate in the House to have the Science and Astronautics Committee which has looked not just at astronautics as somewhat of a special area within research and development, but has looked at research and development on a broad scale.

Representative John C. Culver (Democrat of Iowa) questioned Dr. Seamans about the need for more integrated planning in the congressional committee system. In response to one of Culver's questions, Dr. Seamans responded:

Maybe it is time for the Committee on Science and Astronautics to be looking at broader issues because the NASA program is obviously less now than it was 5 or 6 years ago. Maybe this committee shouldn't be considered primarily to oversee one agency, but rather should review the aggregate of all Federal R. & D.

There were so many Members of Congress eager to testify before the Bolling committee that the time was extended for Members of Congress. On September 13, Brown presented his customarily broad-gauge approach to congressional reform, including a recommendation for a Select Committee on Energy. Brown's suggestion eventually came to pass in 1977, and resembled the 1971 resolution of Tennessee's Congressman Richard H. Fulton. At that time, however, the Bolling committee was not inclined to proliferate more committees, but rather to make sense out of the existing structure. Faced with a negative reaction, Brown then stated:

If a new source requires new technologies which are not now available, it might be a part of Science and Astronautics, which deals with basic science, research and development.

DR. SHELDON'S INFLUENCE

Once the hearings were completed, the Bolling committee at the end of the year went into the crucial premarkup period when the tentative draft of a bill was prepared. At this point, the importance of the staff of the Bolling committee became of critical importance. Bolling's Chief of Staff was Dr. Charles S. Sheldon II, who had been assistant director of the Select Committee on Astronautics and Space Exploration and also technical director of the House Committee on Science and Astronautics. When Teague testified on June 8, he remarked:

I think the members should know that Dr. Sheldon was a senior staff member on the Science and Astronautics Committee about ten years ago.

Also on the Bolling staff was Spencer C. Beresford, another alumnus of the Science Committee staff, and Robert C. Ketcham, who later became a counsel for the Science Committee. Dr. Sheldon played a key role in seeing that the first draft bill and committee print included a substantially increased jurisdiction for the Science Committee. Although this fact cannot be documented with any precision, Dr. Sheldon's constant presence and advice certainly did nothing to hurt the Science Committee during this critical period.

THE DECEMBER 7 WORKING DRAFT

The Bolling committee produced a 119-page committee print—a "Working Draft"—on December 7, 1973. One of the objectives stated in the preface, entitled "Basic Organizing Principles," paralleled the testimony of Teague and McCormack:

House committees should be organized to give coherent consideration to a number of pressing policy problems whose handling has been fragmented, e.g., *** energy research and development.

Under the draft resolution, the Science Committee was to lose jurisdiction over science scholarships (which went to the Education committee) and biomedical R. & D. (which went to the Commerce and Health committee). But there were vast gains: Overview of military R. & D., to be shared with Armed Services; oceanic and atmospheric sciences, from Merchant Marine and Fisheries; energy R. & D. (including nuclear) from Interior, Commerce, Joint Committee on Atomic Energy, and Merchant Marine; environmental R. & D. from Interior, Public Works, Commerce, and Merchant Marine; and weather, from Commerce. The working draft also spelled out the extension of the principles of oversight to include "legislative preview" or "foresight" and advocated a strengthening and expansion of the oversight role of each committee. This turned out to affect the Science Committee to a major extent, because of the special oversight role assigned to R. & D.

SOURCE OF THE NEW NAME: "SCIENCE AND TECHNOLOGY"

In the December 7, 1973 draft, the new name "Science and Technology" first surfaced. The only recorded source of inspiration for this name change is in the May 11 testimony by Mosher who included the following in his prepared remarks:

I would like to enter a vigorous protest and disavowal here against the careless habit of many Members who refer to us as "the Space Committee." That label obviously derives from the concentrated emphasis, now ten years or so ago, that our committee once devoted to the space program, and with proud success. But that distorted emphasis, I now assure you, is a thing of the past. As John Davis has em-

phasized in his testimony here, and other committee members will also agree, an ever-increasing amount of our committee time and effort is necessarily devoted to a variety of science and technology problems and proposals other than those involved in the space program. We maintain a strong allegiance to NASA, and in fact NASA's needs and goals are of increasing variety and interest; but it is essential to consider astronautics and aeronautics in the perspective of all our other R. & D. activities, and to coordinate them all.

Therefore, I personally would welcome—although I consider it a relatively minor matter—a recommendation from your Select Committee on Committees that our S and A Committee might best be renamed, to indicate the true breadth of its mission. Perhaps we should be the Committee on Science and Technology, or on Science and Engineering. (I do emphasize this is only my personal recommendation.)

When he actually delivered his prepared remarks, Mosher said to the Bolling Committee:

I think I have emphasized why it is not correct to call it the Space Committee. I think it much more accurate to call it the Science Committee. It might well be that you might want to recommend this is sufficiently superficial and not an important item—a new name for the committee such as the Science and Technology Committee or some such terminology as that.

Once the new name was included in the December 7, 1973 working draft, it stuck, and was included in the revised legislation passed in 1974 to become permanent in 1975.

WORKING BEHIND THE SCENES

Neither the Bolling committee nor the Science Committee were idle following the printing of the December 7 working draft. The Bolling committee was carrying on intensive discussions with individual Members, committee chairmen and staff, and outside groups who could help build a consensus through making additional suggestions for improvements in the highly tentative draft. There were many memoranda floating back and forth within the Science Committee as various staff members analyzed the implications of the December 7 draft. Teague was on the phone frequently, and engaged in numerous conversations with Bolling to encourage the Bolling committee to stick to its initial inclination to enhance the power and jurisdiction of the Science Committee. Sheldon was working quietly behind the scenes toward the same objective. As Chairman of the Democratic caucus, Teague was in a strategic position to exert his prestige in an influential way. Completely sold on the importance of coordinating energy research and development, encouraged by the successful efforts of McCormack as leader of the task force and Subcommittee on Energy, and convinced that the Science Committee must expand or descend toward oblivion, Teague found a very sympathetic audience in Bolling and other members of Bolling's committee.

The decisions of the select committee were not very difficult to make on the issue of expanding the jurisdiction of the Science Committee. It was either a case of adding to the responsibilities, or phasing out the committee completely, and nobody suggested the latter course. Instead, additional duties were transferred in the interests of logic, sound substantive reasons, and the successful interchanges between the principals and the staffs involved. Dr. Sheldon's constant presence then helped seal in and protect the decisions.

SWIGERT MOBILIZES THE TROOPS

Swigert did not relax his efforts. He bombarded his Task Team Leaders with memoranda early in January 1974, offering a number of alternative subcommittee alignments assuming the December 7 recommendations were put into effect. Of course, there was still a long way to go before the Bolling committee resolution eventually went to the floor of the House, where, as we shall see, it was defeated in favor of a less thorough structural reorganization of Congress. Nevertheless, Swigert lined up his troops and made the telling point that the months ahead carried the potential of vast benefits for the future of the committee. Swigert insisted that carefully-laid plans were necessary to take full advantage of the opportunities.

Meanwhile, the Bolling committee began its public markup sessions on February 4, 1974. Officially, these markups were termed "Open Business Meetings." Right out in the open, the five Democrats and five Republicans went through the text of the December 7 draft, ratifying certain sections, making some changes, freezing the language as they went along, and occasionally taking votes when issues stirred differing opinions. A clue as to how various Bolling committee members felt toward expanding the Science Committee jurisdiction was contained in some of the comments made by Representative C. W. Bill Young (Republican of Florida), a member of the Armed Services committee, who fought against giving the Science Committee oversight over military R. & D. The colloquy went like this, with Bolling and Dr. Sheldon defending the jurisdiction:

Chairman BOLLING. The intent there is to give them a look at and a hope that they will be able in a nonlegislative way to help coordinate the kinds of things that go in a variety of different places in R. & D. Do I have that correct?

Dr. SHELDON. That is correct. * * *

Mr. YOUNG. I want to make sure that we are not making this a super committee over and above the Armed Services Committee or the other committees we are talking about.

HOW NOT TO ELIMINATE RUMORS

This process of discussion had only been under way a few days when Swigert felt compelled to dispatch a rather peremptory memo-

random to "All Professional Staff," dated February 8, 1974, which read in its entirety:

As you can well imagine, there is much maneuvering going on with regard to the jurisdictional evaluations of the Select Committee on Committees.

Since we in the staff are not privy to all the positions taken by the Chairman and Members of our Committee, there should be no opinions expressed or discussions held by staff members relative to the Select Committee's recommendations.

Perhaps Swigert intended for this memorandum to mean that staff members should not speculate with the news media, although this is not clear. In any event, it was akin to an officer assembling his unit on the parade ground and handing down an edict that henceforth all latrine rumors must cease immediately. It was difficult to carry on intensive planning, when the committee was at the crossroads and could contemplate a bright and challenging future, without some weighing of possible alternatives.

SCIENCE COMMITTEE RECOMMENDED AS MAJOR COMMITTEE

In March 1974, the Bolling committee made its recommendations. They brought joy to the Science Committee, to be raised once again to the status of a major, exclusive committee—one of the 15 nominated for that prized category. Beyond existing jurisdiction, the March bill extended authority over all research and development in energy (including nonmilitary nuclear and thermonuclear energy), environmental, civil aviation, and scientific prototypes; that is, working models. Authority was added over oceanic and atmospheric sciences and sea grant programs. Although the committee was already exercising jurisdiction over science policy and technology assessment, these functions were specifically spelled out in the bill accompanying the report. The Bolling committee also set up a new function called "special oversight," which authorized general investigations without legislation, and specifically singled out the following R. & D. oversight areas for assignment to the Science Committee: biomedical, agricultural, military and water research and development.

The rationale offered for these decisions was indeed heartening. The March report noted:

As far as practicable, the related components of science and technology are united in a single committee that can provide the necessary expertise and develop comprehensive and coherent policies.

After listing the various new categories of work being assigned to the Science Committee, the Bolling committee added:

The select committee proposes to place all other elements of scientific research and development under the jurisdiction of this committee. It further proposes to give the committee a responsibility not previously assigned to any committee of Congress—over-all review of Federal research and development. * * *

The significant effects of the Teague-McCormack testimony and the behind-the-scenes work of Dr. Sheldon emerge in this comment by the Bolling committee:

In energy research and development particularly, the committee has taken strong initiative and undertaken significant preparatory work.

The March report of the Bolling committee was duly circulated and publicized. Intensive work began to line up support. Symington wrote Bolling:

I think it is a landmark effort where both fools and angels fear to tread, thus opening the way for a natural man who wants to see his country governed more rationally. For this you are to be congratulated and thanked.

Wydler, fascinated by the prospects of an interesting floor fight ahead, wrote Bolling:

I look forward to a consideration of the House committee organization on the floor. It will certainly be exciting and I'm sure it will be a moment of high drama. Nothing seems to generate emotion as much as committee jurisdiction.

DEMOCRATIC CAUCUS TORPEDOES PLAN

On May 9, 1974, the Democratic caucus assembled to consider the Bolling committee recommendations. Teague chaired the raucous caucus debate. Unlike formal proceedings in the House of Representatives, he had no experienced parliamentarian by his side to advise him concerning rules, precedents and points of order. The opposition to the Bolling report was a strange coalition of every committee member who felt his jurisdiction was being reduced, plus ambitious Members who saw the recommendations as disturbing their power bases. Labor fought the plan because it divided the Education and Labor Committee, and numerous other special interests joined the fight to defeat a plan they felt might upset their influence. Three experienced infighters teamed up to gouge the Bolling plan: Representatives Phillip Burton (Democrat of California), Wayne L. Hays (Democrat of Ohio), and John D. Dingell (Democrat of Michigan.)

Defeat of the Bolling plan in the Democratic caucus turned on an unfortunate ruling by Caucus Chairman Teague. After some heavy artillery had been fired at Bolling, Burton moved to refer the entire matter to the Democratic Committee on Organization, Study, and Review, headed by Representative Julia B. Hansen (Democrat of Washington.) Mrs. Hansen chaired a committee which had made several reports on the seniority system and committee operation in the past. Burton asked for a secret vote on the referral motion, and Bolling immediately asked for a rollcall on whether the vote should be secret. This was a crucial point, because there were some Democrats who secretly opposed the Bolling recommendations, but were publicly

committed to reform, hence did not want to be caught voting against reform in a public rollcall vote. Teague ruled that Burton's motion did not require a recorded rollcall, but could be conducted by secret ballot. Enraged at an obviously incorrect ruling, Bolling charged up to the front of the caucus and persuaded Teague that he ought to at least go out and consult the House Parliamentarian, which Teague agreed to do. When Teague returned, he announced that the Parliamentarian agreed with his ruling. Bolling simply threw up his hands; he did not learn until later that Teague had presented the whole issue to the Parliamentarian in a somewhat confusing fashion, and the Parliamentarian, who had not been present, gave an equally confusing answer.

The applecart was upset. Teague, who should have been strongly on the side of the Bolling reforms, was perhaps leaning over backward to be a scrupulously impartial chairman. By secret ballot, the caucus voted 95-81 to take a secret ballot vote on referring the Bolling reforms to the Hansen committee. A glum Bolling saw the handwriting on the wall. By the further secret ballot, the caucus voted 111-95 to sidetrack the carefully devised Bolling recommendations and send them on for study and report by July 17 by the Hansen committee.

HANSEN COMMITTEE RECOMMENDATIONS

"That was a very stormy committee," recalls Mrs. Hansen as she reflected on the complex negotiations during the early summer of 1974. "They would each go out and talk to their constituents," Mrs. Hansen said, referring to the crush of lobbyists outside the secret meeting room. During the negotiations, Teague kept in frequent touch with Mrs. Hansen and his other good friends on her committee. "Teague was very, very nice to work with," Mrs. Hansen recalled. "He was interested in protecting his turf, but he was never adamant on it." As head of the Interior Appropriations Subcommittee, Mrs. Hansen had more than a passing acquaintance with what was being done in the energy field, and she related: "I was convinced the United States was doing very little energy research," hence she was equally interested in concentrating energy research in the Science Committee. She termed the issue of what to give the Science Committee "not a battle at all."

For Ralph Nader, a long-time opponent of nuclear power, and friend of Burton, there was a somewhat different issue involved. He knew McCormack's strong pronuclear attitude and appreciated the fact that although Holifield on the Joint Committee on Atomic Energy felt the same as McCormack, Holifield was ready to retire and McCormack would probably last many years. Nader feared placing

jurisdiction over nuclear research in the Science Committee where McCormack held an energy subcommittee chairmanship. Eventually, the Hansen committee decided to keep the Joint Committee on Atomic Energy with the feeling it might be phased out two years later. This meant taking back the jurisdiction over nonmilitary nuclear research originally conferred on the Science Committee under the Bolling proposal.

Power politics operated behind the scenes in the Hansen Committee. On at least two occasions, galley proofs of suggested jurisdictional arrangements revealed that the Science Committee had been stripped of its future power in the energy R. & D. area. On both occasions, Teague personally got on the telephone to Speaker Albert, Mrs. Hansen, and key members of the Hansen Committee. Miraculously, the jurisdiction was each time restored—a tribute to Teague's personal prestige in the House.

The Hansen committee scuttled the Bolling design of a "one-track" system on committee service. This meant that the Hansen recommendations allowed Members to serve on more than one committee (with the exception of Rules, Appropriations, and Ways and Means). This also meant that the Science Committee would not be a major, exclusive committee as under the Bolling recommendation.

The elaborate plans of the Bolling committee to have an Energy and Environment Committee to concentrate work in these fields beyond the research and development phase were also ditched by the Hansen committee. These functions were retained by the Commerce, Interior, and Joint Atomic Energy Committees, among others. Bolling put this way:

Thirteen different committees and subcommittees of the House have jurisdiction over aspects of the energy squeeze, and there is, thus, little wonder that a forward-looking national energy policy is still beyond our grasp. All the chairmen of those 13 committees and subcommittees fumbling over energy policy want to keep their chairmanships.

DIFFERENCES BETWEEN HANSEN AND BOLLING PLANS

There were a few other differences between the Hansen committee report and the Bolling plan as they affected the Science Committee. The Hansen committee specifically omitted the following references to legislative jurisdiction for the Science Committee which had been added by the Bolling committee: Science policy, scientific prototypes, sea grant programs, and oceanic and atmospheric sciences (however, the Hansen Committee specifically gave jurisdiction over the National Weather Service to the Science Committee). There was an interesting

difference in the wording of the "special oversight" clauses. The Hansen committee language read:

The Committee on Science and Technology shall have the function of reviewing and studying, on a continuing basis, all laws, programs, and Government activities dealing with or involving nonmilitary research and development.

The major difference, of course, was that the Hansen committee removed any special oversight over military R. & D. from the Science Committee.

SIMILARITIES IN HANSEN RECOMMENDATIONS

The big similarities between the Hansen and Bolling recommendations, to the benefit of the Science Committee, were the addition of civil aviation research and development, and environmental research and development. All energy research and development except nuclear (the latter being dropped from the Bolling recommendations by the Hansen committee) was pegged for the Science Committee. This gave the Science Committee pieces of jurisdiction formerly held by Commerce, Interior, Merchant Marine, and Public Works Committees.

So far as the nuclear area was concerned, the Hansen report stated:

Nuclear research and development is specifically excluded, but it seems clear that the jurisdiction of this committee is meant to include those matters relating to non-nuclear research and development presently handled by the AEC labs, for example.

The Hansen proposals were presented to the Democratic Caucus on July 23, 1974. Unlike the earlier tug-of-war within the caucus, this time by voice vote it was agreed to send both the Hansen and Bolling proposals to the House floor for debate and disposition. An open rule from the Rules Committee also allowed amendments to be presented freely on the floor. But before the Rules Committee voted, there was a vast amount of filibustering as numerous Members who opposed any change at all asked to appear and use up time before the Rules Committee, hoping to prevent any action at all.

The Science Committee staff was not idle. On September 26, Swigert distributed to all members a huge summary, with charts, of the alternative proposals. On the day the House debate opened, the full committee met for a briefing on the proposals. Finally, on September 30, the House commenced its extensive debate and amendment of the plans.

TEAGUE SPEAKS AGAINST MINORITY STAFF

As the debate opened, Teague became the first Science Committee member to lob a shell at the Bolling committee. He objected to the requirement that the minority be entitled under the rules to one-

third of the staff, and one-third of the committee funds. Teague thundered:

Mr. Chairman, I think that provision is wrong. I say that it does the committee a great disservice. There has never been any politics in this committee, and there never have been in the Committee on Veterans' Affairs. To make this provision mandatory is wrong.

Bolling and others hastened to add that the Bolling recommendations did not mandate for the minority to have its own staff if it did not want to do so. Bolling said:

There is no compulsion on the minority to demand a staff. Obviously that is the situation that prevails in the gentleman's committee.

While this colloquy was taking place, it was apparent that some of the Republican members of the Science Committee did not fully catch the meaning of Bolling's last phrase, or certainly they would have arisen to object. As introduced on September 30, the Hansen committee resolution authorized each subcommittee chairman and each ranking minority member (up to six) to hire and compensate one staff person—rather than the authority under the Bolling provisions for the minority to have a total of one-third in case they asked for it.

During the general debate, Representative Paul S. Sarbanes (Democrat of Maryland), who along with Representative William A. Steiger (Republican of Wisconsin), headed up the drafting team for the Bolling committee, stated:

Research and development has been brought together in the Science and Technology Committee in recognition of the importance of that area for the future of this country. I am very frank to say that I believe many greatly underestimate the significance of that jurisdiction and what a properly strengthened Science and Technology Committee could do in anticipating the problems that are facing the Nation down the road.

SCIENCE COMMITTEE WINS FIGHT FOR AVIATION R. & D.

The first effort to chip away at some of the additional jurisdiction given the Science Committee was attempted by Representative Dan H. Kuykendall (Republican of Tennessee) who offered an amendment which, among other things, would keep jurisdiction of civil aviation research and development in the Commerce Committee. Milford and Wydler both spoke against the amendment. Wydler indicated that "there is totally fractured jurisdiction at the present time," with FAA R. & D. under the Commerce Committee and NASA R. & D. under the Science Committee. The amendment lost, with Wydler noting:

This has caused serious problems. As a matter of fact, there is a very serious one in the jet noise retrofit program where both agencies were working on and have worked on a different type of retrofit program. So I think this step being offered in this amendment would be a great step back and should be rejected out of hand.

Several Science Committee members inexplicably supported Kuykendall's efforts to take jurisdiction away from the Science Committee: Brown, Davis, Downing, Frey, Symington, and Winn.

OCEANIC AND ATMOSPHERIC SCIENCES

On the final day of debate, Hechler and Mrs. Hansen engaged in a carefully planned colloquy designed to firm up the jurisdiction of the Science Committee in oceanic and atmospheric sciences. The Hansen committee had not, like the Bolling committee, given full jurisdiction over oceanic and atmospheric sciences to the Science Committee, and had narrowed the jurisdiction only to the "National Weather Service." Therefore, Hechler and Mrs. Hansen worked out the parameters of a mutually agreeable colloquy. The colloquy developed along these lines:

MR. HECHLER. For several decades we have been moving in the direction of integrating oceanic and atmospheric research because of their complex interactions * * *. The National Weather Service has forecasting responsibility for oceanography as well as weather, and includes such items as sea state, swell, ocean temperature, and storm effects. A major finding from the space program is to reinforce the first point and to add to it the understanding that the Sun, the atmosphere, and the oceans are closely interrelated. In summary, I would hope that it is the intent of House Resolution 1248 to encourage integration of oceanic and atmospheric research rather than to divide the research effort.

MRS. HANSEN. If the gentleman from West Virginia will yield, it is indeed our intent to encourage such integration of research work in the oceanic and atmospheric research area.

MR. HECHLER. Based on this intent, would it appear to be a reasonable interpretation that the Committee on Merchant Marine and Fisheries and Committee on Science and Technology should cooperate closely in legislative and oversight matters affecting the National Oceanic and Atmospheric Agency, and that, in the case of subjects having a high content of research and development, joint referrals and oversight would be appropriate?

MRS. HANSEN. That is a reasonable interpretation, if the gentleman from West Virginia will yield further. I am sure our atmospheric and oceanic research program could only benefit from the expertise available on both the Committee on Merchant Marine and the Committee on Science and Technology.

THE VOTE ON THE HANSEN PROPOSALS

At the close of all the amendments, debate, and clarifications, the House finally had an opportunity to make its choice between the Bolling proposal and the Hansen substitute as amended. The House voted 203 to 165 in favor of the less drastic Hansen proposal, which did not disturb the status quo as much and generally preserved com-

mittee prerogatives. There was a wide divergence of opinion among Science Committee members. Those voting for each of the approaches are listed below:

<i>Bolling</i>	<i>Hansen</i>	<i>Not voting</i>
Hechler	Downing	Teague
Davis	Fuqua	Hanna
Symington	Flowers	
Roe	Cotter	
McCormack	Milford	
Bergland	Thornton	
Pickle	Frey	
Brown	Goldwater	
Gunter	Camp	
Mosher		
Bell		
Wydler		
Winn		
Esch		
Conlan		
Parris		
Cronin		
Martin		
Ketchum		

SUMMARY OF REFORMS

To summarize the new jurisdiction which the committee received effective at the start of the 94th Congress in January 1975, the following was added:

Civil aviation research and development.

Environmental research and development.

All energy research and development except nuclear research and development (but including nonnuclear R. & D. handled by the Atomic Energy Commission laboratories.)

National Weather Service (a floor colloquy indicated the intent is to "encourage integration of oceanic and atmospheric research.")

Special oversight over laws, programs, and Government activities dealing with nonmilitary research and development.

THE BOAT TRIP

Just as soon as the House of Representatives had voted the committee reforms in October 1974, Swigert got busy preparing plans and charts in order to weigh the options for staff expansion and subcommittee jurisdictions in the next Congress. Teague faced a major decision in the fall of 1974: How best to capitalize on the expanded jurisdiction of the committee and at the same time maintain the leadership and control necessary to carry out a unified policy. He decided to use a thoroughly democratic procedure to ascertain

what a majority of the committee wanted on subcommittee jurisdictions, and at the same time he decided to exercise his chairman's prerogative to make staff decisions himself. Neither of these decisions were announced, but they became apparent as events unfolded.

For the first time, the 1974 reform amendments required the Democrats and Republicans to have their presession caucuses in December of each election year. Committee assignments were made in December, but subcommittee chairmen were selected in January. To resolve a very heated argument over jurisdictions, Teague decided he would invite those majority members who would be returning to the committee in 1975 to take a boat trip on the Potomac River.

The night before the Democratic caucus assembled in December 1974, was rainy and squally, so the boat did not move from the dock for awhile. It was an ideal craft for discussions; nobody could escape. Teague borrowed the boat from LTV Corp., announcing that he wanted to get the Members away from the Capitol so they wouldn't be interrupted by telephone calls. Before the boat had left the dock, the phone rang and Speaker Albert was on the line for Teague.

For a long period into the evening, very little was done except to drink and socialize. By the time the Members lined up at the galley to enjoy a tasty plate of food, almost everybody was in a high mood. Still no shop-talk. Swigert and Wilson, the only non-Members who went along, were enigmatic. Swigert had done his job by circulating in advance a detailed memorandum on the various options, with this conclusion: "The staff makes no recommendations." Teague was equally noncommittal.

Finally, after a leisurely dinner and more drinks, Teague assembled the group in the cabin. It was not necessary to deliver a pep talk on the challenging new responsibilities facing the committee in 1975: Everybody appreciated this already. But Members were eager to detect if there were some signal from Teague as to how he preferred to organize the committee, so they could act or react. Swigert gave a recap of the memorandum he had already circulated on the options. Then Teague went around the circle, asking each Member (by seniority) to give his views on how the jurisdictions of the subcommittees should be arranged.

MCCORMACK ADVOCATES ONE ENERGY SUBCOMMITTEE

Unquestionably, the most articulate and best-structured case was presented by McCormack. He strongly urged that energy had been split up too long, and now that the committee had a rare opportunity to pull it together, the chance should not be muffed. To separate energy research and development into two subcommittees would merely

contribute to the confusion which had prompted the reform itself when all energy R. & D. was concentrated in the Science Committee, he contended. It was a hard sell, and an impressive one.

There were arguments on the other side, some of which Swigert had summarized in the options he presented to Teague. In terms of work load distribution among the subcommittees, it was fairly obvious that there would be a disproportionately large concentration in a single energy subcommittee. Also, if every committee member got a chance to serve on his first choice subcommittee, a single energy committee would have been overloaded with applicants.

When it came time for Flowers to speak, he came as close as he could without discourtesy in denouncing his host, Teague, for the brutal fashion in which the task force on energy and especially the Subcommittee on Energy had been created by passing over Flowers in 1971 and 1973. Everybody spoke very freely that night. Nobody minded at all what anybody else said. It was all done with the high good humor of old friends and drinking buddies.

McCormack had set a target to shoot at. Pretty soon, a lot of the discussion seemed to center around the issue McCormack had presented. Teague bluntly interrupted and inquired: "All right, do you want two energy subcommittees or one energy subcommittee?" There was a babble of voices. Members started to line up in two camps: It was them or us.

WE'LL JUST TAKE A VOTE

Finally, Teague surprised everybody by suddenly announcing: "If you guys can't reach a decision, we'll just take a vote on it." The babble of conversational argument stopped. He was serious. This wasn't all cut and dried. He really wanted to decide this in a democratic fashion. There were a couple of jibes about a "secret ballot." There were other remarks about "open meetings" and "sunshine laws." It was finally decided, by nobody in particular, to resolve this burning issue by a show of hands. By a very slim margin—nobody remembers exactly how much—the Members voted for two energy subcommittees. McCormack had all the strength of logic on his side, but he had one handicap: Nobody was very sure who might opt for the second energy subcommittee, and it is likely that several of the aspirants lined up in favor of two subcommittees. Because of West Virginia's role among the leading coal producers in the Nation, it was assumed that Hechler as second-ranked member of the committee would have a strong interest in heading up the Fossil Subcommittee. He soon let it be known that he would bid for that subcommittee. Flowers bided his time until 1977, because in 1975 he preferred to retain his Judiciary Committee subcommittee chairmanship.

The next day at the Democratic caucus, Hechler and McCormack sat down together to chat about the future. McCormack indicated once again that the energy crisis demanded a unified approach among the interrelated sources of energy, and it simply did not make sense to proceed in a divided fashion as two subcommittees would perforce do. McCormack suggested that a fully independent sphere of action could logically be carved out through Hechler being named chairman of a task force on coal, oil and natural gas which would be coordinated through an overall Energy Subcommittee such as McCormack had chaired in 1973 and 1974. Hechler responded: "No. But to insure that our subcommittees work together, I suggest that you serve on my subcommittee and I serve on yours." This was done.

NAMING THE ENERGY SUBCOMMITTEES

The preliminary agreements reached on the boat trip were quickly and painlessly ratified when the Democratic caucus met at the opening of the 94th Congress in January 1975, followed by an organization meeting of the full committee. McCormack named his energy subcommittee first, calling it "Energy Research, Development and Demonstration," with jurisdiction over solar, geothermal and other advanced energy systems, energy conservation and utilization, and special oversight over nuclear energy R. & D. It was an attractive and challenging field, and 23 Members bid for McCormack's subcommittee as against only 15 for Hechler's. The naming of the subcommittee set off the first of a series of polite arguments between the two subcommittee chairmen. Hechler contended that the title of McCormack's subcommittee inferred that it covered the entire energy field, and that the title should be more explicit and not all-encompassing. McCormack countered that each Member had the right to name his own subcommittee title, and Hechler had perfect freedom to do what he pleased. Although he personally preferred a shorter title, Hechler then named his subcommittee "Energy Research, Development and Demonstration (Fossil Fuels)." The other subcommittees were:

Space science and applications (Fuqua).

Science, research and technology (Symington).

Domestic and international scientific planning and analysis (Roe, succeeded by Thornton).

Environment and the atmosphere (Brown).

Aviation and transportation research and development (Milford).

Ad hoc Subcommittee on Special Studies, Investigations, and Oversight (Teague) established in 1976.

NUCLEAR R. & D. JURISDICTION

Additional jurisdiction over nuclear research and development was added to the Science Committee in 1977 with the abolition of

the Joint Committee on Atomic Energy. Representative Jonathan B. Bingham (Democrat of New York) submitted the amendments in the Democratic caucus December 8, 1976, which split the joint committee jurisdiction among the Interior, Commerce and Science Committees. Bingham stated in the Caucus:

Generally, it is the intention of this resolution that the jurisdiction of the Interior Committee would parallel that of the Nuclear Regulatory Commission, and the jurisdiction of the Science and Technology Committee would parallel that of ERDA.

When the House convened on January 4, 1977, to adopt the new rule for the 95th Congress, Bingham placed in the Record a "memorandum of understanding" which clarified the nuclear regulatory functions which would go to the Interior Committee, and the public health and environmental protection against radiation functions conferred on the Commerce Committee. It was strictly a Commerce-Interior deal which made no mention of the Science Committee. This impelled McCormack to follow up with a colloquy prearranged with Majority Leader Jim Wright (Democrat of Texas) to insure that the Science Committee jurisdiction was protected and clarified as the full intent of the new rule. The colloquy went in part as follows:

Mr. McCORMACK. Would the majority leader state that the intention of the new rules involving this jurisdiction is as indicated by Mr. Bingham, that is, that jurisdiction for all activities of the Energy Research and Development Administration, except for weapons research and fabrication, falls within the jurisdiction of the Science and Technology Committee? * * *

Mr. WRIGHT. The gentleman from Washington is completely correct. * * * This includes fusion energy research.

Mr. McCORMACK. It is my understanding that the intent of the amendment is to transfer the jurisdiction for energy research and development activities performed under contract for the Energy Research and Development Administration at the National Laboratories to the Committee on Science and Technology.

Mr. WRIGHT. Yes; that is correct. * * *

Having established that point, McCormack went on to congratulate the majority leader for his announced intention to establish a Select Committee on Energy, "a goal I have sought for many years." McCormack then lashed out at the "chaotic situation" produced by the Bingham amendments. He denounced the "splintering of energy jurisdiction in the House" as a result of the Bingham amendments, which redistributed among three committees what was once within the Joint Committee on Atomic Energy. He said he hoped the new Select Committee on Energy would be able to pull things together through its "wiser deliberations."

FLOWERS BIDS FOR FOSSIL AND NUCLEAR IN 1977

A few weeks later, Flowers surprised McCormack by bidding to take over the chairmanship of a new Fossil and Nuclear Energy Sub-

committee, as McCormack retained a subcommittee handling advanced energy technologies.

These, then, were the major jurisdictional expansions in the Science Committee authority. As always, there were minor forays which other committees made to establish footholds as when Rep. John M. Murphy (Democrat of New York) persuaded Speaker Albert in 1976 to appoint him to chair an Ad Hoc Committee on the Outer Continental Shelf. Murphy proceeded to consider legislation which included R. & D. authority, which he only dropped from his bill after Science Committee protests. On the other side of the coin, Scheuer raised some eyebrows in several other committees through his aggressive use of "special oversight" powers, when he served as chairman of the Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation commencing in 1977.

RELATION WITH ARMED SERVICES COMMITTEE

The abolition of the Atomic Energy Commission and the Joint Committee on Atomic Energy presented some new jurisdictional problems. The Joint Committee interface with the Armed Services Committee had been frequent, but not many Science-Armed Services negotiations had been necessary since the old Brooks-Vinson days. In 1977, the ERDA authorization bill included funding over which the Science and Armed Services staffs each claimed jurisdiction, in areas relating to Laser Fusion and Naval Reactor Development. When an impasse was reached, Representative Mel Price (Democrat of Illinois), Chairman of the Armed Services Committee and Teague negotiated an agreement. Teague related:

I went to Mel Price and Mel and I worked it out. Our staffs couldn't agree. We just got together and worked it out.

On September 13, 1977, in a floor colloquy, Teague and Price had this exchange:

MR. TEAGUE. We should all recognize that the fiscal year 1978 budget submission was the first opportunity for the Committee on Armed Services and the Committee on Science and Technology to exercise their new responsibilities for nuclear energy legislation which was given to the two committees by rules adopted in the 95th Congress. ERDA was not prepared to submit legislation to the two committees in a form that would coincide with their jurisdictions. Is that not true?

MR. PRICE. That is correct. * * * The Science and Technology Committee which has legitimate concern for the continuation of research that could eventually lead to dramatic civilian applications for laser fusion, has added \$9.2 million which we agree is a modest yet appropriate addition to the authorization bill. * * *

MR. TEAGUE. I thank the gentleman for his cooperation, his recognition of the interest to both of our committees in laser fusion development, and feel that we have reached a reasonable compromise at this point.

In the same bill, the Science Committee recognized the traditional jurisdiction of the Armed Services Committee over Naval Reactor Development, but agreed that certain new R. & D. activities were civilian in nature and would be handled by the Science Committee in future year budget requests. In 1978, Teague wrote Price on May 9:

I am pleased that this year our two committees have not had the type of jurisdictional controversies that we faced last year.

Teague raised some questions prompted by language in the Armed Services Committee report, resulting in an exchange of letters with Price.

JURISDICTIONAL PROBLEMS WITH ENERGY

The House establishment of an Ad Hoc Committee on Energy did not by any means resolve the complex issues raised when the Department of Energy in 1978 started sending up its authorization requests which involved the jurisdiction of four other committees—Interior, Commerce, Armed Services, and International Relations. The joint or sequential referral process established by the 1974 reforms could not solve the problem of overlapping jurisdictions. Nor could the separate distribution of certain titles of the bills eliminate conflict, because there were heated arguments over substantive areas within titles. Since the Department of Energy was formed not only from ERDA, but from the Federal Energy Administration and portions of the Department of the Interior, the organizational structure almost invited jurisdictional fights on Capitol Hill.

The most contentious jurisdictional squabbles were had with Representative John D. Dingell (Democrat of Michigan). Dingell, a member of the Commerce Committee, carried on a running fight over numerous issues which were being handled by the Science Committee. Teague made this observation about the Chairman of the Commerce Committee, Representative Harley O. Staggers (Democrat of West Virginia) and one of his subcommittee chairmen:

Harley Staggers was easy to work with. John Dingell—now that's another story.

Matters came to a head with the Commerce Committee in the spring of 1978, when an attempt was made in that committee to assert jurisdiction over a number of items in the R. & D. areas of solar, conservation, nuclear and fossil energy in the Department of Energy authorization bill. The Commerce Committee contended, for example, that items such as the R. & D. program for the gas-cooled thermal reactor were clearly on their way to commercialization and therefore within the purview of the Commerce Committee. This was only one of the many differences of opinion which led to extensive negotiations

among Teague, Staggers, and Udall, who finally arrived at an agreement on the jurisdictional issues.

DALE MYERS SUPPLIES DEFINITIONS

In order to help clarify the meaning of R. & D. and other terminology utilized by the Department of Energy, Teague hit on the idea of writing to Dale D. Myers, Under Secretary of the Department of Energy, asking him to provide a set of clear definitions of various processes on the long road toward commercialization. Myers responded on May 10, 1978, with a copy of the definitions to Dingell. When the DOE authorization bill was being considered in the House on July 17, Fuqua offered an amendment incorporating definitions of the following terms into the bill: Basic and applied research; exploratory development; technology development; concept and demonstration development and operational systems development. Dingell, having a copy of the definitions, strenuously objected to their inclusion into the legislation. After some sharp words exchanged with Fuqua, Dingell attempted unsuccessfully to get the amendment knocked out on a point of order as not germane to the bill.

Perhaps the most objective and statesmanlike commentary on the entire issue was the brief conclusion written by Brown, printed as "Additional Views" appended to the DOE authorization bill:

Generally, committees fight out their jurisdictional struggles until everyone tires of the process, with the result that legislation begins to be drafted more and more narrowly to avoid future jurisdictional conflicts. * * * I believe it is impossible to organize our committees, or the agencies of the Executive Branch, in a manner which would eliminate overlaps and conflicts. We continuously reform or reorganize our structure to minimize conflicts, but it would be foolish to pretend that we can ever achieve unambiguous organizational lines in an ever-changing society. Instead, we must focus on procedures for resolving the inevitable ambiguities, and concentrate on setting precedents for more effective techniques of resolution than those represented by the handling of this first Department of Energy authorization bill.

Brown went on to recommend that the problems Congress encountered in dealing with the energy bill be looked at as a general organizational problem and not as a special case. He cited similar jurisdictional conflicts in the areas of welfare reform, urban policy, water policy, and health care. He concluded:

We can continue to deal with these questions in a fragmented, ad hoc fashion, such as the establishment of ad hoc select committees, or simply letting the disputes be settled on the House floor, or we can attempt an approach of negotiation and arbitration, perhaps with the assistance of the Rules Committee. * * * I simply believe that there must be a better way than our recent actions indicate, and everyone's time can be put to more productive use if we find it.

MINORITY STAFF

The successive committee chairmen fought consistently against a separate staff for the minority. Brooks, Miller and Teague shared the same philosophy—that the committee staff was there to serve all committee members without reference to party. The issue did not arise while Brooks was chairman, but Fulton as ranking minority member brought it up frequently during the 1960's. As pointed out on pages 183-184, Fulton was finally successful in appointing the first minority staff member, Richard E. Beeman, in 1968.

From that point on, the struggles of the minority to obtain fairer staff representation increased each year. Since the Republicans were in a minority during the entire period and had not controlled the Congress since 1953-55, it is unfortunate that the debate took on strictly partisan overtones. This made it more difficult for the minority to argue, which they did very effectively, that the caliber of legislation was raised through better data compiled by staff working directly for minority members. It was undeniable that no matter how fair the chairman, and no matter how nonpartisan the staff, there were occasions when minority members took a position on legislation which needed staff aid on issues like drafting amendments, researching arguments, and presenting minority testimony. In addition, of course, it was obvious that the regular staff responded with higher priority to requests from the chairman, subcommittee chairmen and executive director. The minority wanted a staff which would be more responsive.

During the 1960's when Fulton was the ranking minority member of the full committee, there was a growingly favorable sentiment in the Congress and among political scientists and journalists toward better minority staffing. While the Democrats controlled the White House up until 1969, this became more marked. But even with the period of Republican administrations from 1969 until 1977, the support for minority staffing grew. There were a few maverick Democrats who dared to buck party lines to lend support for minority staffing. For example, when the Monroney-Madden Joint Committee on the Organization of Congress made its 1966 report, of the six House Members, three Democrats and three Republicans had an early standoff on the issue. Hechler broke the tie by voting with the three Republicans to support staffing for the minority. When the House Rules Committee finally came out with a congressional reform bill in 1970, it also contained a provision for minority staffing. Very quickly after the 1970 election, Fulton sent word to Miller in California that the minority was ready to exercise its rights under the 1970 legislation. There followed the precipitous action of the 1971 Democratic caucus, ratified by the House, wiping out the short-time gift bestowed on the minority.

MOSHER AS RANKING MINORITY MEMBER

With the death of Fulton in October 1971, Mosher was next in line to be ranking minority member. He had been elected in 1960, and joined the committee in 1961. A smalltown newspaper editor in several communities, graduate of Oberlin College, and former Ohio State senator, the 6-foot 4-inch Mosher stood out as one of the most liberal members of his party--so much so that there was a question within Republican ranks whether he should be allowed to move up to be ranking minority member of the committee in 1971. He was one of the first opponents of the war in Vietnam, a strongly positive supporter of education and scientific advancement, coauthor of the legislation establishing the Office of Technology Assessment and Vice Chairman of the Technology Assessment Board, and coauthor of the bill restoring the Science Adviser and scientific machinery in the White House. "Supportive" is one of Mosher's favorite words, and in practice he was intelligently supportive of the successive committee chairmen and also the programs generally sponsored by a majority of the committee. Scholarly in manner, tolerant of differing opinions, even tempered, a good negotiator, Mosher approached issues with the equable grandfatherliness of a senior academician.

Wylder, Rumsfeld, Winn, Goldwater, and younger committee Republicans pushed Mosher to put up more of a scrap for minority staff. In 1973, there was a Republican confrontation of sorts with Teague and his newly appointed staff director, Jack Swigert. With Teague's blessing, Swigert had set up a system of task team leaders in all areas of the committee's jurisdiction. He indicated that as the committee's responsibilities grew (in areas like energy) it was necessary to shape the staff structure and operation toward goals of greater productivity and efficiency. Swigert stressed the importance of clear lines of command and authority reaching up to the executive director.

On July 18, 1973, Swigert outlined his plans for a reorganization of the committee staff to implement these ideas. That afternoon, following his presentation, 11 Republican committee members met to discuss the implications of Swigert's staff plans. They unanimously signed approval of a three-page memorandum which Mosher drafted to Teague and Swigert, reiterating their strong feeling that the integrity of the hard-won minority staff must be preserved at all costs. At that time the minority staff consisted of Carl Swartz, Joseph Del Riego and Theresa Gallo (secretary). Mosher's memorandum stated in part:

We consider it of the utmost importance that the identity and reality of the minority staff (all three members) shall be maintained as a working team, with a high degree of autonomy, responsible basically to the ranking minority member, but cooperating and participating as fully and productively as possible in the work of the full staff of the committee*** and that certainly means working closely with Swigert and his "team leaders" and amenable as far as possible (without losing minority identity) to their planning, procedures and programming.

We believe it essential, in order to maintain the minority staff identity, that the three minority staffers continue to have office space which allows them to be grouped together, working closely together as a team, as they now are; but we recognize, of course, that it may be necessary to shift them to a different location.

SWIGERT AND MINORITY STAFF

On the way over to the Capitol on the House subway late that same day, Mosher and Teague talked about the problem. Mosher could get no immediate resolution of the issue, hence the memo, which suggested that Teague and Swigert meet with the minority members "for whatever further discussion may be necessary to arrive at a complete understanding." Swigert penned on the memo when he gave it to Teague: "Can't Mr. Mosher decide for minority?" The upshot was a lengthy meeting between Mosher and Swigert, at which Swigert outlined "areas of agreement" and "areas of disagreement." One central bone of contention was whether the minority staff could or should be moved around by Swigert to even out the workload, and whether or not the minority staff should, for command purposes, report directly to Swigert rather than to the minority members led by Mosher. Teague made clear his personal feelings, reiterating that although Swigert had told him he was a Republican when he had been hired, Teague warned him he would be fired if he ever mentioned again he was a Republican on a staff which Teague insisted must be nonpartisan.

The issue of relationships remained basically in disagreement. Mosher's attitude was best expressed in the final paragraph of his cheerfully worded covering letter to Teague:

I hope that both you and Jack will recognize that the positions we have asserted in our memo represent a completely friendly and genuine desire on our part to coordinate and cooperate with you in establishing a very effective, efficient staff operation for the committee, even though we are very firm in our conviction that the identity of the minority staff and its prime responsibility to the minority members must always be recognized and very real.

In point of time, these negotiations were proceeding while the Bolling committee was holding hearings on congressional reform during the summer of 1974. The major effort of the committee was pointed toward putting its energy foot forward and bidding for expanded jurisdiction on that attractive base. When Teague and McCormack testified before the Bolling committee in June, their far-ranging arguments effectively demonstrated the value of centralizing expanded energy jurisdiction in the Science Committee, they did not stoop to arguing against minority staffing, nor did they even mention it. For his part, Mosher brought up the issue in his May 11 testimony:

I have a very strong devotion to our former colleague, George Miller. He vigorously resisted appointing or allowing any minority staff because he felt it would be a divisive influence in the committee and in the staffing. I believe that now, after only very brief experience, that has not proved to be so and I am glad that it has not.

Mosher also added:

Based on my own personal experience and observations, I can testify that even the minimum of minority staffing we now have in the Science and Astronautics and Merchant Marine Committees has produced very positive, valuable results. Those two committees are excellent, practical examples of how a minority staff can operate with considerable independent autonomy—responsible immediately to the needs of the minority members, yet of genuine service to the whole committee, and without creating any partisan disruption.

BOLLING RECOMMENDATIONS ON MINORITY STAFF

The Bolling committee recommended that professional staffs of committees be expanded from 6 to 18, and clerical staffs from 4 to 12. The minority members of a committee were allowed the opportunity to select one-third of the staff of 30, including one-third of the funds available through the annual expense resolutions voted by the House Administration Committee. Although the Hansen committee report did not include a provision for minority staff, Representative Frank Thompson, Jr. (Democrat of New Jersey), a member of the Hansen committee, recognized the need to include this provision to insure enactment of the Hansen package, so he offered the amendment on the House floor and it was adopted.

At the opening of the 94th Congress in January 1975, the House adopted a resolution which spelled out more specifically the legislative foundation for minority staff. The resolution authorized the ranking minority member of up to six subcommittees "to appoint one staff person who shall serve at the pleasure of the ranking minority party member." The House rules also contained the authorization for a total of six professional and four clerical personnel to be assigned to the minority when so requested by a majority of the minority members.

1975 marked the beginning of the expansion of the minority staff in conformity with the House rules. At the organization meeting of the committee on January 23, 1975, Teague declared:

Ladies and gentlemen, as far as the staff is concerned, there is no question that we are going to add a number of staff members to this committee. We can not do it at this time because we don't have any money and because we don't have space. I am going to ask the committee to approve the present staff as is and then as soon as we get some money to hire further staff members the Chair will come back to the membership of the committee for other staff members who may be hired. Is there discussion?

The following interchange then occurred between Mosher and Teague:

Mr. MOSHER. Mr. Chairman, as I understand it, the approval of your motion does not condition in any way or prejudice in any way further discussion of the minority staff and that sort of thing?

The CHAIRMAN. It does not. The Chair will do everything in his power to completely comply with the new rules concerning staffing as soon as we know what they are. As of this moment, I don't think we do.

Mr. MOSHER. We appreciate that policy on your part.

THE STRUGGLE OVER APPOINTMENTS

Between 1975 and 1978, the minority gradually filled their statutory quota of up to 16 professional and clerical staff members. This was not achieved without a struggle. Both Teague and Swigert fought a rearguard action along several fronts. The minority staff continued to be integrated through the task team leaders, and only gradually did they begin to assume a separate identity. There were a few debates about qualifications of individual staff being recommended. Also, there was always an issue of how many minority staff could be allocated to the statutory (standing) committee staff as against the investigative staff. The advantage of being assigned to the standing staff was that there seemed to be a greater degree of permanency (the standing staff was hired by the committee and paid for by the House without the need for a special expense resolution from the House Administration Committee) and the salary levels could be higher on the standing staff. The investigative staff, funded by annual resolutions through the House Administration Committee, was not as desirable an assignment because there was a salary ceiling, hiring was determined by the chairman, and therefore status and permanency were not as great. Teague resisted what he considered a too-rapid expansion of the minority staff and their understandable desire to obtain more standing committee slots rather than investigative positions.

Prior to 1978, the various minority staff members were scattered throughout the subcommittees and other administrative areas of the committee staff. From the start, there was an effort by the minority to consolidate its efforts at a central location, in order to achieve coordinated direction. Not until June of 1978, however, was this goal achieved with the assignment of Room 2320 of the Rayburn Building to the minority. Minority staff was still assigned to work directly with subcommittees, but after June of 1978 the minority members had a central office to call their own.



Senior Democrat Don Fuqua helps ranking minority member John W. Wydler (Republican of New York) cut the ribbon on the new minority headquarters in Room 2320 Rayburn Building. From left, Fuqua, committee executive director Mosher, Representatives Hamilton Fish, Jr. (Republican of New York), Harold C. Hollenbeck (Republican of New Jersey), and Wydler.

WYDLER BECOMES RANKING MINORITY MEMBER

At the end of 1976, the minority staff was up to nine members. With the retirement of Mosher from the House of Representatives, Wydler moved up to become the committee's ranking minority member. Elected in 1962, Wydler represents the southern part of Nassau County, Long Island, a district he labels the "Fabulous

Fifth." A lawyer and former prosecuting attorney, Wydler's interest in space first drew him to the Science Committee because of the location of the Grumman Corp. at Bethpage, N.Y. The dish-rattling decibels of noise from aircraft at Kennedy Airport soon propelled Wydler into the most outspoken leader in the Congress on aircraft noise. Mosher describes this personality difference:

I never pushed as vigorously as Wydler on minority staffing. I was more in the role of a mediator.

In September 1977, Mosher was summoned out of retirement to become executive director of the committee for the final 16 months of Teague's service as chairman. Once again, he served more as a mediator, with the basic staff work on the minority problem being performed by Colonel Gould in presenting the facts to Teague. But the point man on minority staff was clearly Wydler, who went to bat and refused to accept delay or opposition. In commenting on the minority staff during his testimony before the House Administration Committee on March 1, 1978, Wydler stated:

During the past year, we have expanded the minority staff. These additions have been highly qualified, competent people who have contributed significantly to enhancing the professional capabilities of the committee. *** (They) have a very substantive role in the achievement of the committee's mission. I feel that an autonomous, capable minority staff is extremely important in helping the minority meet its responsibilities.

One of the notable contributions of the minority staff has been the minority briefing book, including objective, pro and con views on some of the major issues confronted by all the subcommittees. Updated quarterly, this briefing book has been found to be a useful tool in interpreting the issues which surface in the committee.

The briefing book was developed by Paul A. Vander Myde, who became minority staff director on August 15, 1977. A tall, personable man with a smooth and easy manner, Vander Myde uses quiet persuasion rather than bombast to get his points across. Following his undergraduate and graduate work at the Universities of Iowa and Minnesota, Vander Myde served at the National Security Agency, as Legislative Assistant to U.S. Senator Bob Packwood (Republican of Oregon), and Executive Assistant to the Vice President from 1971 to 1973. After 6 months as a staff member of the Domestic Council in the White House, he was appointed Deputy Assistant Secretary of Agriculture in 1973, his last position before being selected as minority staff director.

WYDLER CLASHES WITH TEAGUE

In the spring of 1978, Wydler clashed with Teague on their respective interpretations of the size, assignments and qualifications of minority staff. Wydler told the House Administration Committee that

"we continue to experience difficulties in bringing new staff members on board." He contended:

Last year when I appeared before this committee, I testified that a ratable portion of the new investigative personnel—four professionals and a proportionate number of clerical personnel—would be coming to the minority. This has not happened to date. In fact, we are led to understand that the minority will be allotted only the minimum number of personnel under the House Rules, and even those people have been hard to come by. * * * The minority intends to continue to press for an equitable share of the committee staff allocations.

Both Teague and Wydler refused to budge. Wydler felt that the statutory minimum of 12 professional and 4 clerical employees was all right for a starter, but that as the total committee staff expanded, so should the minority staff. When the traditional one-third allocated by the congressional reforms of 1974 had slipped proportionately down to less than one-fifth, the minority felt it was time to stand up and fight. Aided by several minority members of the House Administration Committee, Wydler maneuvered to have the Science Committee's funding resolution tabled until the minority staffing issue was resolved.

Teague's philosophy was expressed in an April 19 letter to Chairman Thompson of the House Administration Committee:

The size of our staff is determined by an analysis of requirements and skills as well as the availability of funds to defray related expense. Is it your Committee's position that we should hire staff regardless of need? Mr. Wydler seems to believe that he is entitled to sixteen minority staff members whether or not warranted by the Committee's needs. * * * The staff of the Committee on Science and Technology, in my mind, has never been selected on a partisan basis. Except for one professional staff member, Charlie Mosher, I do not know the party affiliation of any of our 83 staff members; nor am I concerned. Our recruiting system, in my opinion, is second to none on Capitol Hill and is based upon *qualifications*. Selection of personnel is carried out on a competitive basis. We are a research and development oriented Committee and the subject matter under our jurisdiction does not lend itself to partisan politics.

As happens in most confrontations, each side gave a little and Wydler released the funding resolution he had been holding hostage. Despite the tone of the letters, and the occasional angry verbal outbursts, Teague and Wydler remained good friends who were able to work out the problem so the business of the committee could move forward.

SUBCOMMITTEE CHAIRMAN'S STAFF

Although the issue of minority staffing received more attention, there was an analogous situation with respect to designation of one staff member by subcommittee chairmen. In the eyes of Brooks, Miller, and Teague, such a choice would weaken the control of the chairman over coordinated policies within the committee. For a subcommittee chairman, this meant an opportunity to get a competent and qualified person who would make the work of his subcommittee more meaningful and effective.

Throughout the Nation and in the Congress, the spirit of reform was abroad in the late 1960's and early 1970's. To make Congress more responsible and responsive, a large contingent of younger and middle-level House Members were raising questions about the seniority system and how to open up new initiatives for the overwhelming majority of Members who had not been around long enough to rise to become chairmen. In 1970, the Democratic caucus set up the Democratic Committee on Organization, Study and Review which was headed by Mrs. Hansen. The January 1971 Democratic caucus passed by a substantial majority a recommendation of the Hansen Committee, stipulating:

A subcommittee chairman shall be entitled to select and designate at least one staff member for said subcommittee, subject to the approval of a majority of the Democratic members of said full committee.

MILLER OPPOSES CAUCUS RULE

When the organization meeting of the full committee assembled on February 23, 1971, it occurred to one Member that this might be a good provision to implement in the rules of the committee. Miller made it clear that he did not like any effort to incorporate the caucus rule as a committee rule. At the start of the meeting, he engineered a quick maneuver, as follows:

The CHAIRMAN. Gentlemen, this meeting will come to order. This is the organizational meeting of this committee, and it has always been a closed meeting, and under the new rules if we have a closed meeting (it) will require a majority vote of the committee. Therefore, I will now entertain a motion that the organization meeting be closed.

Mr. FULTON. I so move.

Mr. KARTH. I second.

The CHAIRMAN. It has been moved and seconded that the organization meeting be a closed meeting. All those in favor signify by saying "aye." Contrary minded? The "ayes" have it. The meeting is a closed meeting.

It all happened so fast that very few Members read any significance into the adroit move to insure that no searchlight of publicity could pick up what was to occur.

Chairman Miller moved ahead smoothly. Members at the opening of the new Congress were in a glowing mood. Nobody wanted a fight, that was obvious. Suddenly, Miller said:

Adoption of the rules.* * * It is my thought that the committee approve the rules as adopted in the previous Congress. But if there is no objection—

Suddenly, Hechler heard himself shouting: "Mr. Chairman." He quickly submitted two amendments which had been adopted by the Democratic Caucus, one to allow each subcommittee chairman to

designate one staff member, and the other to prevent the committee chairman from heading more than one subcommittee and authorizing subcommittee chairmen to handle legislation in the House which emerged from their subcommittees.

REPUBLICANS ATTACK SUBCOMMITTEE CHAIRMAN'S POWER

Fulton immediately attacked the resolutions. He contended that this would make the subcommittee chairman so powerful that it would destroy staff unity and coordination. He said that this was totally different from the concept of a minority staff which would be working for the entire committee, whereas the proposal would enable a staff member to work for only one person.

Frey and Wydler joined in to oppose the amendments. With some sarcasm, Frey wanted to know if this was the same type of reform which "you helped us out on our staffing" referring to the action of the House in 1970 which had been reversed by the Democratic Caucus in 1971. "I accept the needle with grace," Hechler responded. Wydler joined the battle with zest. Turning to Hechler he said:

You talk about the caucus as if we are a part of it. This is a foreign group as far as I am concerned, and I don't feel bound in any way.

Now Miller brought out his biggest artillery. He rapped the gavel sharply and stated:

The Chairman of the Democratic caucus wants to make a comment, who happens to be the ranking member of this committee. Mr. Teague.

Teague put it straight:

I was also on the Hansen Committee and I was outvoted by 6 to 1 by subcommittee chairmen on this particular (amendment) that Ken has here.

Like a lawyer who knew precisely what this witness would answer, Fulton then asked:

Does the Chairman of the Democratic Caucus, might I ask, favor the amendment of the gentleman from West Virginia?

Teague answered: "The Chairman of the Democratic Caucus does not." The meeting then got a little wild, and went along like this:

Mr. WYDLER. I raise the point of order whether it is proper to adopt these rules of the committee, a committee of the House of Representatives, rules that refer to the powers of the Democratic caucus.

Mr. HECHLER. May I be heard on that point of—

The CHAIRMAN. You may not. Rollcall has started—

Mr. HECHLER. May I be heard for five minutes?

The CHAIRMAN. You may not be heard. You have been heard twice on that matter. *** All right. Proceed with the rollcall. I vote no.

The amendments were crushed by a vote of 22 to 3. The author of the amendments realized that it was impossible to form a coalition with the Republicans to help them with minority staff, which he had long advocated, if they would help on this issue. But the issue did not die, and although it took a long and at times bitter struggle the committee finally swung around and accepted the idea as though it had been right from the start.

Fulton received his reward for supporting his chairman in the uneven fight to defeat the Hechler amendments. A revealing aftermath was that the events of February 23 contributed to the establishment of a Subcommittee on International Cooperation in Science and Space, for which Fulton had been agitating unsuccessfully for years. On February 24, 1971, Executive Director Ducander wrote a persuasive note to Chairman Miller, urging him to comply with Fulton's repeated requests. One of Ducander's arguments was: "Fulton was strong behind you in the organizational meeting yesterday, let's don't forget that."

With remarkable speed, Chairman Miller on the same day dispatched a memorandum to all committee members, announcing the formation of the new international subcommittee. Fulton had effectively scored his brownie points (see also chapter X on the establishment of the new subcommittee and its operation.)

SWIGERT AND SUBCOMMITTEE STAFFING

The Bolling-Hansen reforms which took effect in 1975 resulted in the inclusion in the House rules of the principle that subcommittee chairmen could designate one of their own staff members. This principle was totally unacceptable to Swigert, who argued that it would undermine efficient coordination of the staff and the power of the chairman. Several subcommittee chairmen attempted to make staff recommendations, and the word was circulated that those recommended lacked qualifications for the job. "We don't want political hacks invading our highly competent staff," was the warcry. As the minority staff started to grow, some members ruefully observed that the rules were helping give the minority their staff while handcuffing some of the subcommittee chairmen.

These were not easy issues to resolve. But the trend was clear. The breadth and depth of the subject matter, the wide-ranging nature of the oversight required, and the sheer complexity of the substantive matters being handled all added up to a need for two staff qualities which were very much in demand—high competence and mutual understanding. The subcommittee chairman who hired an incompetent was

obviously going to hurt himself, and this fact was never acknowledged by those fighting to preserve one of the last bastions of the status quo. Gradually, the walls came tumbling down, and as time went on the trend was very clearly in the direction of greater freedom for staff selections by the subcommittee chairmen.

OVERSIGHT SUBCOMMITTEE

In the early 1970's, separate oversight subcommittees operated primarily for NASA oversight (see chapter IX.) Teague chaired the Subcommittee on NASA Oversight in 1970, Downing in 1971 and Fuqua in 1972. When Teague became chairman of the full committee in 1973, he stressed that each subcommittee should conduct vigorous oversight functions within its jurisdictional areas, and that general oversight would be conducted through the full committee and the staff. In 1973 and 1974, the oversight work by the committee and its subcommittees proceeded aggressively. Even when bogged down by annual authorization hearings, the subcommittees managed to get out on field trips to review and assess not only research and development but also construction of facilities. The committee's No. 1 specialist in construction oversight was Colonel Gould, who took the lead in oversight up to the time he moved up to become Deputy Director in mid-1975, and Ron E. Williams took over as construction specialist in early 1976.

The Bolling committee report, and the reform legislation enacted in 1974, put a great deal of stress on the need for beefing up the oversight function in all committees. The Bolling report required the establishment of an oversight subcommittee on every standing committee, setting up a network of oversight reports supervised by the House Committee on Government Operations. The legislation as finally enacted in 1974 softened these requirements somewhat, while preserving the central oversight authority of the Government Operations Committee and also requiring the reporting of oversight plans and progress. But instead of requiring a specific oversight subcommittee, the final version of the reforms gave every committee with 15 or more members the alternative of either establishing an oversight subcommittee or conducting oversight through subcommittees. The 1974 reform law stipulated:

The establishment of oversight subcommittees shall in no way limit the responsibility of the subcommittees with legislative jurisdiction from carrying out their oversight responsibilities.

In addition, as noted above, the Science Committee was given special oversight over all nonmilitary research and development.

TEAGUE'S PHILOSOPHY OF OVERSIGHT

As 1975 began, Teague reflected on the new challenges of oversight presented to the committee:

Throughout all of its years, the committee spent much of its time on oversight—the intensive review of agencies under its legislative jurisdiction to determine how well they are doing their job and how they are spending the taxpayers' dollars. Members and staff have spent long periods on comprehensive investigations which involved hearings in Washington, field hearings at government research centers and contractor plants, weekend visits while Congress was in session, and a lot of plain hard work and study. I know—I have done it for years. But, this is how you get to know how well a program really is working, how effective management is, how the dollars are being spent. * * * A House oversight agenda coupled with more emphasis on each committee can result in a more effective Congress. Congress should do more than pass laws and approve budgets; it should see how those laws are carried out and what is done with the money it approves in the budgets.

Teague's philosophy on oversight was that Congress was obligated to check on whether the money authorized was being spent in accordance with the intent of Congress. He did not feel that "oversight" should entail actually going down into any agency to tell them how to run their internal operations, unless they were clearly violating the intent of Congress.

During 1975, Swigert analyzed the oversight responsibilities of the committee and came up with a detailed proposal for a "Special Investigations and Oversight Task Team," which he submitted to Teague on October 9, 1975. Although Teague originally had expressed his opposition to a separate oversight subcommittee, Teague eventually approved the hiring of a new "task team leader" for oversight, with this twofold purpose, as outlined by Swigert:

- (1) Provide a special investigative force to be employed by Chairman Teague on matters requiring selective investigating effort, and
- (2) In coordination with subcommittee chairmen provide a special mechanism for independent management review to assist in carrying out assigned oversight responsibilities.

It is envisioned that the new task team will be headed by a specially selected person with an extensive background in management, engineering, and an intimate knowledge of the programming, budgeting, and legislative processes.

Swigert and his Deputy, Colonel Gould, interviewed a number of applicants and finally agreed that the man who obviously had the best qualifications for the job was Dr. Robert B. Dillaway. "Too good to be true," wrote Colonel Gould on Dr. Dillaway's written application, although he was one of the first to recognize that there was a problem in Dr. Dillaway's performance. With 15 years of impressive experience at North American Aviation, and even more responsible tours of duty with the Secretary of Navy and Army Materiel Command, Dr. Dillaway had served on the faculties of the Universities of Illinois, California,

and Stanford, teaching such subjects as engineering systems, nuclear reactor engineering, fluid mechanics, rockets, and controls. On paper, he looked so good that a senior minority staff member, Michael A. Superata asked: "Why does he want to come here?"

After some negotiations, Dr. Dillaway was hired early in January 1976.

On January 20, Teague met with Dr. Dillaway, Colonel Gould, and Swigert. Teague laid down these rules:

- Don't go around the subcommittee chairmen.
- Coordinate with all concerned.
- First thing is to develop a plan.
- Letter would be prepared to introduce Dr. Dillaway.
- Dr. Dillaway to talk with subcommittee chairmen.

ESTABLISHMENT OF SSIO SUBCOMMITTEE

Early in February, Teague established the Ad Hoc Subcommittee on Special Studies, Investigations, and Oversight, which included the following members:

Democrats

Olin E. Teague, Texas, *Chairman*
 Ken Hechler, West Virginia
 Don Fuqua, Florida
 James W. Symington, Missouri
 Mike McCormack, Washington

Republicans

Charles A. Mosher, Ohio
 John W. Wydler, New York

The subcommittee held no hearings, did not meet to discuss the appointment of Dr. Dillaway, and in fact held only one meeting in its entire existence—on August 24, 1976, after the "SSIO" operation got into trouble.

In announcing the establishment of the subcommittee, Teague sent a notice to all committee members on February 3, 1976, reviewing the oversight work and plans under way by the standing subcommittees, adding:

However, I believe a more intensified program should be undertaken if we are to be fully responsive to the House rule concerning this matter. * * * It is not my intent that this ad hoc subcommittee infringe upon or erode the jurisdictional responsibilities delegated to the present subcommittees. Rather, I visualize this new organizational element will serve to augment the efforts of existing subcommittees and provide independent management reviews as appropriate. * * * Dr. Dillaway has been charged with developing a special studies, investigations, and oversight plan in coordination with the subcommittees on matters pertaining to their areas of jurisdiction. He will be seeking inputs from the subcommittees on areas that they feel should be subjected to additional review or areas beyond their present capabilities, time-wise and staff-wise. Following development of plans for each subcommittee area, the ad hoc subcommittee will prioritize the overall plan, assure there is no duplication, and implement the plan about mid-April 1976.

MIXED REACTION TO DR. DILLAWAY

Dr. Dillaway visited the offices of the subcommittee chairmen and staff. There was a mixed reaction to his mode of operation. Some subcommittee chairmen felt he could perform a useful function in oversight pertaining to activities of the agencies under the Science Committee jurisdiction; others felt that he was simply overlapping or duplicating useful oversight work already in progress at the subcommittee level.

Colonel Gould, who had endorsed Dr. Dillaway's qualifications as looking extremely good on paper, began to have reservations about his methods of operation. In a May 25 memorandum to Swigert, Gould noted:

As I have indicated before, the Dillaway oversight plan, which apparently has been endorsed, is an overly ambitious undertaking and would probably take 3 or 4 years to complete. Further, some of the issues outlined in the plan are present-day viewpoints, which may not prevail even during the next session of Congress.

Meanwhile, Dr. Dillaway was assembling a rather sizable staff which included personnel borrowed from the Congressional Research Service, General Accounting Office, and other sources. At times, news would filter back concerning strange telephone calls emanating from Dr. Dillaway. NASA Administrator Fletcher was ordered to appear in his office within one hour, and Dr. Fletcher called around to try to find out who Dr. Dillaway was and why Dr. Fletcher's presence was so peremptorily needed. (P.S., he did not come.) There were also strange meetings and private business relationships which appeared to be commingled with committee business. On August 10, a meeting of the full committee was held, at which time Swigert presented the SSIO request to hire two consultants. McCormack, Goldwater, and Hechler raised a number of questions about the nature of the investigations and qualifications of the consultants, who were being hired for oversight over ERDA.

Mosher asked:

Is it contemplated that these consultants would be hired before the subcommittee has met? As far as I am aware, the subcommittee has never met to consider its role, its jurisdiction.

Temporarily chairing the meeting, Hechler suggested that action on hiring the consultants be deferred until such time as the SSIO Subcommittee could meet. Goldwater in supporting the recommendation, added that the subcommittee should at the same time work out "proper coordination" with the subcommittees. So far as the two energy subcommittees were concerned, there was a strong feeling that Dr. Dillaway was clearly getting into areas which the subcommittee already had in hand, in process, or contemplated in the future.

When the SSIO subcommittee met on August 20, it was obvious that Dr. Dillaway's philosophy of oversight did not coincide with Teague's. He not only visualized a large empire of personnel, but also talked confidently of straightening out several agencies under the committee's jurisdiction. Numerous complaints were raised at the first and last meeting of the SSIO Subcommittee. Once at a later time when he was asked how he controlled Dr. Dillaway, Teague responded: "I didn't control him; I decontrolled him."

Most of the reports drafted by the SSIO Subcommittee were never printed. One, however, proved useful: A report jointly prepared by the SSIO Subcommittee and the Brown Subcommittee on the Environment and the Atmosphere on the Environmental Protection Agency's Research Program, with primary emphasis on the Community Health and Environmental Surveillance System (known as CHESS). This investigative report was prepared largely at the direction of Brown and his staff by the Science Policy Research Division of CRS and a group of consultants from various health agencies. The report grew out of allegations which were first published in the Los Angeles Times at the end of February 1976, charging EPA with falsification of data on the adverse health effects of air pollution. Joint hearings were held, in which SSIO did not participate, but which were conducted by the Commerce Subcommittee on Health and the Brown Subcommittee. SSIO did take part in the investigative report. Although the report upheld the honesty and integrity of the EPA project leader, it did raise a number of questions about proper evaluation of data assembled in the future.

With the assistance of Dr. John V. Dugan of the minority staff, two unpublished but useful studies were completed on NASA's aeronautical R. & T. base effort as related to the Department of Defense, and a review of NASA's energy R. & D. role.

Early in 1977, Dr. Dillaway left the staff and the subcommittee was not heard from again. It was not revived in the 95th Congress.

A brief obituary on the SSIO Subcommittee was relayed to the Government Operations Committee on February 18, 1977, referring to the fact that the subcommittee had been created on an "experimental basis":

The experiment resulted in findings that, although beneficial to the oversight function, some duplication of effort occurred because of jurisdictional overlap, despite controls invoked to preclude same. Investigations and Oversight has not been reconstituted for the 95th Congress.

SUBCOMMITTEE ON INVESTIGATIONS AND OVERSIGHT

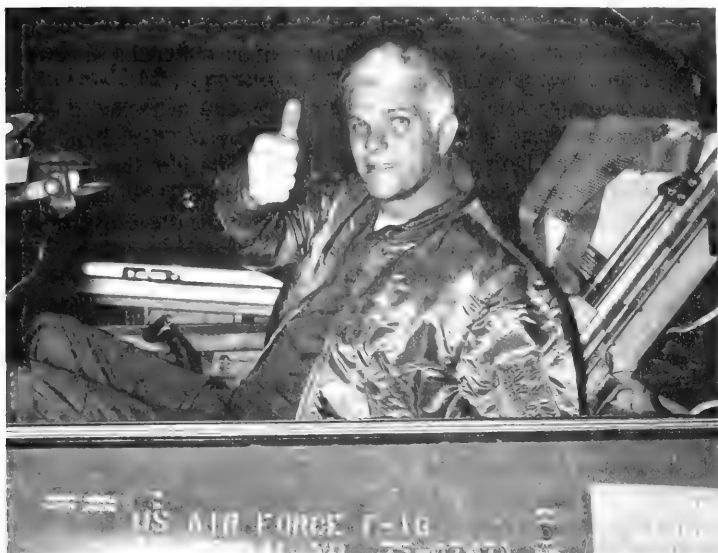
One of the early decisions facing the committee when the Democratic members assembled for their caucus on February 1, 1979, was the

issue of whether to establish a seventh Subcommittee on Investigations and Oversight. The chief proponent of this concept was Ottinger, who had unsuccessfully attempted to put the idea across at the opening of the prior Congress in 1977. In 1977, the new subcommittee had been voted down for two reasons: Some members were simply voting against giving Ottinger a subcommittee, which he could have claimed in 1977 had a new one been established; and also in 1977 the memory of the failure of Dillaway's operation was fresh in everyone's mind.

By 1979, the climate had changed. By seniority, Ottinger was slated for a different and probably more important subcommittee in any case. In a memorandum distributed to all members, he had argued that the other subcommittees did not have the time or staff to investigate fully the manner in which the committee authorized billions of dollars, the implementation of procurement policies, and compliance with the intent of the Congress. Ottinger also attached to his motion a proviso drawn from the House Public Works Committee rules, that no investigation could be undertaken without consultation with the subcommittee chairman whose jurisdiction was involved, and also requiring the approval of the chairman of the full committee. Scheuer strongly endorsed the Ottinger motion, citing the success of the Investigations Subcommittee in the Commerce Committee, and underlining the opportunities which such a subcommittee offered to junior committee members to make their mark.

While noting the unfortunate past experience with an oversight subcommittee, Fuqua stressed the importance of effective oversight. He concluded: "It may work. It may not." Lloyd and Ambro, either of whom seemed to have an opportunity to become chairman of the new subcommittee if it were established, both spoke in favor of its creation. On a rollcall, Ottinger's motion prevailed, 17 to 2. Lloyd then faced a dilemma.

When it was Lloyd's turn to single out which subcommittee he preferred to chair, the environment and investigations subcommittees were the only two left. Naturally disappointed that he did not get a chance to head up the subcommittee handling his first love—aeronautics and aviation—Lloyd made the decision that the investigations subcommittee might afford him an opportunity to launch some broader inquiries of interest. He ended the uncertainty quickly by opting to take over the Subcommittee on Investigations and Oversight.



Representative Jim Lloyd (Democrat of California), chairman of the Subcommittee on Investigations and Oversight.

JIM LLOYD AS SUBCOMMITTEE CHAIRMAN

Tall, flaxen haired and self-assured, Jim Lloyd had been a Navy pilot for 21 years -including combat as a fighter pilot in the South Pacific during World War II. He had a longstanding practical interest in aeronautics. A native of Helena, Mont., Lloyd had received a B.A. from Stanford and a M.A. from the University of Southern California. Following two years as public relations director for the Aerojet General Corp., he set up his own public relations firm. He served as a member of the city council and also as mayor of West Covina, in eastern Los Angeles County, while he was teaching political science at Mount San Antonio College in Walnut, Calif. Lloyd won his congressional seat as an aftermath of the Watergate upheaval in 1974 in a newly created congressional district, but nevertheless had to run against incumbent Republican Congressman Victor Veysey whose own district had been carved up in the redistricting. He

eked out a 705-vote victory in 1974, advancing to wins of 10,500 and 12,000 in 1976 and 1978. Lloyd's voting patterns reflected a somewhat conservative suburban district.

After considerable study and many interviews, with the approval of Chairman Fuqua, Lloyd chose as his staff director 35-year-old Jerry Staub, who had been counsel of the Transportation and Aviation Subcommittee on which Lloyd had served since 1975. With degrees in history from Gettysburg College and law from the University of Florida, Staub's major interest has been in international law and astrophysics. Like Lloyd, he had been a fighter pilot in the Navy. Staub also had two years of experience with the Senate Committee on Aeronautical and Space Sciences.

MEMBERSHIP AND JURISDICTION

The following members were assigned to the Subcommittee on Investigations and Oversight in 1979:

Democrats

Jim Lloyd, California, *Chairman*
 Ronnie G. Flippo, Alabama
 Albert Gore, Jr., Tennessee
 Bill Nelson, Florida

Republicans

Manuel Lujan, Jr., New Mexico
 William Carney, New York
 Toby Roth, Wisconsin

The jurisdiction was set forth in the committee rules as follows:

Review and study, on a continuing basis, of the application, administration, execution, and effectiveness of those laws, or parts of laws, the subject matter of which is within the jurisdiction of the committee and the organization and operation of the Federal and private agencies and entities having responsibilities in or for the administration and execution thereof, in order to determine whether such laws and the programs thereunder are being implemented and carried out in accordance with the intent of the Congress. In addition, the Subcommittee on Investigations and Oversight and the appropriate subcommittee with legislative authority may co-operatively review and study any conditions or circumstances which indicate the necessity or desirability of enacting new or additional legislation within the jurisdiction of the committee, and may undertake future research and forecasting on matters within the jurisdiction of the committee. The Subcommittee on Investigations and Oversight shall in no way limit the responsibility of other subcommittees from carrying out their oversight responsibilities, nor shall any investigation be undertaken by the Subcommittee on Investigations and Oversight without (a) consultation with the chairman of the appropriate subcommittee with legislative authority and (b) approval of the chairman of the committee.

THE TRIP TO MEXICO

As the junior of all subcommittees, one of the first handicaps the Lloyd subcommittee discovered was lack of space. With his congressional office in the southeast corner of the Cannon Office Building, and

his staff housed in cramped quarters in the old FBI Building, Chairman Lloyd soon found that he was one Metro stop away from his own committee staff. Lloyd pursued a wise course in the first few months of his subcommittee's existence, laying very careful plans for the future instead of rushing in to establish public visibility at the expense of committee good will. The subcommittee's first major activity was a field trip to Mexico, May 3-7, 1979. The subcommittee and staff were joined by Brown, whose Science, Research and Technology Subcommittee also held later hearings on scientific and technological cooperation between the United States and Mexico, with Lloyd chairing one of the hearings. The Mexican trip included a meeting with President Lopez Portillo, as well as members of CONACYT, the Science Council of Mexico. The group examined the potential for the transfer of technology and energy resources between the United States and Mexico, also assessing the role that science and technology might play in recent agreements to expand Mexican-American cooperation resulting from President Carter's Mexican trip.

The group was personally escorted to the Mexican oilfields by officials of Pennex, the Mexican National Oil Co., and visited the International Maize and Wheat Improvement Center, birthplace of the Green Revolution. In the report on the trip, recommendations were made for closer joint cooperation and agreements to speed the development of better trade relations between the United States and Mexico, with particular emphasis on petroleum, natural gas, and technology transfer.

During July 1979, the Lloyd subcommittee held hearings in Washington, D.C., and Los Angeles, Calif., on the aeronautical design of the DC-10, as an aftermath of the worst tragedy in U.S. aviation history when an American Airlines DC-10 lost an engine on takeoff and crashed on May 25 near O'Hare International Airport in Chicago, Ill. The subcommittee investigated the technical aspects and design in order to recommend future modifications.

RESEARCH PROGRAMS TO AID THE HANDICAPPED

For many years, Teague had been interested in and concerned with programs which involve handicapped people. As a disabled combat veteran who had spent many years working with veterans' program in his capacity as chairman of the Veterans' Affairs Committee, Teague had become intimately acquainted with the work being carried on in veterans' hospitals, rehabilitation centers, and the limited amount of research going forward in other agencies like the Department of Health, Education, and Welfare. Teague's personal interest in the handicapped was further enhanced when he suffered a stroke and his left leg was amputated in 1977.

The Bolling-Hansen reforms in 1974 had transferred biomedical research from the jurisdiction jointly held by the Science and Commerce committees to concentrate it exclusively in the Commerce Committee. Nevertheless, the Science Committee was given special oversight over biomedical research as one portion of the generous grant of authority which covered all nonmilitary R. & D.

In 1975, when NASA testified before the committee in their authorization hearings, NASA Administrator Fletcher led off with a series of demonstrations of recent spinoffs from technology developed for the space program. These included a voice-controlled wheelchair for quadraplegics, and a rechargeable cardiac pacemaker for heart attack victims. Teague resolved that it was time to build on what NASA was doing through committee initiatives in research for the handicapped. Brown talked with Teague after the hearing, and they agreed that it would be very useful for the committee to undertake some work in aiding the handicapped. It was decided to assign the work administratively under the umbrella of the Science, Research and Technology Subcommittee.

During his service on the Veterans' Affairs Committee, Teague was impressed with the testimony delivered every year for the Disabled American Veterans by a young Californian named Sherman Roodzant, who had been recognized as California's Outstanding Veteran of the Year in 1971. In 1974-75, Roodzant was elected State commander of the quarter of a million disabled veterans in California. Early in 1976, following the annual DAV testimony before the Veterans' Affairs Committee, Teague asked Roodzant to stop by his office, where they talked about what the committee could do to stimulate more interest by Federal agencies in research to aid the handicapped. Teague offered Roodzant the job of coordinating for the committee a new effort in this area. Then he called Brown over to his office and they continued their conversation on how the handicapped operation would fit into the committee structure administratively. Brown's interest in disability and problems of the handicapped made this a natural for him to generally take under his wing, in addition to the leadership provided by Teague.

PANEL ON HANDICAPPED RESEARCH

Roodzant's first job was to draw up plans for a panel of experts to study the problems of the handicapped, and identify those areas where a more concentrated and intensified effort should be put forward in programs to aid the handicapped. Teague obtained \$26,000 in the committee-enabling resolution passed in March to cover the cost of the

panel. On August 10, Roodzant presented to the committee the outlines of the study to be undertaken by a 9-member panel (later expanded to 11), headed by Dr. William A. Spencer, director of the Texas Institute for Rehabilitation and Research in Houston, Tex., and chairman of the department of rehabilitation, Baylor College of Medicine. The panel included other experts in medicine and rehabilitation, as well as several handicapped persons, and others who had been active in the field. Roodzant testified before the committee:

In an attempt to present to you a representative group of experts on the problem, we have solicited some 50 organizations interested in these problems and come up with a panel that is proposed before you this morning.

Brown and Krueger spoke in support of the panel, and the committee unanimously approved the plan presented by Roodzant.

To provide guidance and direction for new research and application of technology to aid the handicapped, Teague announced hearings of the Subcommittee on Science, Research and Technology on September 22 and 23, chaired by Brown. In his opening statement, Brown noted that "we have made a commitment to do something about it." He mentioned Teague's special concern, "which extends for many, many years," leading the full committee to make a similar commitment. In addition to members of the panel who testified, Edward Z. Gray, NASA's Assistant Administrator for Industry Affairs and Technology Utilization presented an updated account of NASA's application of space technology to aid the handicapped.

THE BROWN HEARINGS

A wide range of witnesses testified, including representatives of the medical and engineering professions, Federal agencies involved with handicapped persons, and members of handicapped consumer groups. Throughout the hearings, witnesses stressed the need to involve handicapped consumers in the R. & D. phases of technology to benefit the disabled. Acceptance and use by those directly concerned was a point which some researchers did not fully grasp. For example, the whole area of architectural barriers was one in which there were differences of opinion between HUD experts and handicapped people themselves. Fortunately, the committee had already retained W. R. "Dede" Matthews, a Texas architect, who was tackling this problem as a special consultant to the committee. In 1977, John G. Clements joined the staff to work in this and other areas of research programs aiding the handicapped. With the departure of Roodzant in 1979, Clements took over his responsibilities.

In its report in 1977, the panel concluded that a ridiculously low amount—\$31 million annually—was allocated for Federal R. & D. for the handicapped. This amounted to \$2.92 per disabled person in 1976. Whereas all Federal health R. & D. amounted to 3.7 percent of the total public and private health expenditures, Federal rehabilitation R. & D. was only 0.026 percent of such health expenditures.

The panel also concluded that there was a serious lack of coordination and communication among Federal agencies, private organizations, and handicapped consumers concerning R. & D. for the handicapped. As a result, there was recommended a National Council for Research and the Handicapped, including two bodies under one Director—a Government organization and a non-Government group.



Chairman Teague plugs International Disabled Expo. At an April 7, 1977 news conference, Chairman Teague (standing, center rear) helps publicize new technologies to aid the handicapped. Seated at podium are Max Cleland, Veterans Administrator, Senator Harrison H. Schmitt (Republican of New Mexico) and Representative George E. Brown, Jr. (Democrat of California).

Teague called a news conference on April 7, 1977 not only to release the panel report, but also to focus attention on the upcoming International Disabled Expo, to be held in Chicago in August. Max Cleland, Administrator of the Veterans' Administration and a triple amputee, joined Teague in the news conference. Teague stated:

I trust that this committee activity will spark a greater national commitment to effectively utilize the scientific and technological resources at our disposal in attacking the problems of the handicapped, thus allowing all handicapped individuals, both in this great Nation and around the world, to enjoy fuller, more complete lives.

THE SECOND PANEL FOR THE HANDICAPPED

A new and larger panel, including the assistance of several Federal agency representatives, was established in 1977. Teague informed committee members in June:

One-third of the proposed panelists served with distinction on the previous panel, over one-half are handicapped individuals, and over one-half represent the professional community serving the handicapped.

When the panel made its report in March 1978, it pointed out the piecemeal approach in existing research programs, the low level of priority in Federal agencies, and the need for a lead agency to direct the programs. The panel recommended that NASA be designated as the lead agency to coordinate the use of science and technology to aid the handicapped. The panel also recommended a Science and Technology Board for Handicapped Persons. Teague commented in releasing the report:

The Panel's work has pinpointed the issues and provided a framework for a national program. It is now up to the Congress, the Administration and the American people.

The administration bucked the centralization of authority in NASA. This did not fit in with the traditional concept of organization which dictated that such programs should be located in HEW. With the help of Roodzant and other staff assistance, the charter of NASA was amended in 1978 and \$3 million was added to the NASA bill for bioengineering research for the handicapped. In 1978, Congress passed legislation to establish a National Council on the Handicapped, which was recommended by the committee's panel. A vastly increased research program was also placed within HEW. The committee was also instrumental in adding \$2 million to the authorization for the National Science Foundation to set up a handicapped-related research program.

On October 18, 1977, Teague announced a joint hearing on the use of computers in aiding education for the handicapped. The hearing involved the Science Committee Subcommittee on Domestic and International Scientific Planning, Analysis and Cooperation (chaired by Scheuer) and the House Education and Labor Subcommittee on Select Education (chaired by Representative John Brademas—Democrat of Indiana). In announcing the hearings, Teague noted:

The handicapped child faces great difficulties in pursuing his educational goals. Recent advances in technology offer this child the chance to attain an appropriate educational level. It is my hope that the development of computer technology in the education of the handicapped will continue to expand educational experiences for the handicapped child.

Scheuer added:

Communication, perhaps, presents the major obstacle in the education of the handicapped child. Various disabilities such as blindness, deafness and cerebral palsy restrict a good mind from interacting with the world around him, and thus stunt his educational growth. However, the use of computers with their adaptive mechanism give the handicapped child increased learning skills and opportunities unknown until recent years.

ADDITIONAL TEAGUE INITIATIVES

During 1978, Teague launched a whole series of personal and committee initiatives designed to spur both public and private agencies to focus on doing more in a practical and realistic way to aid the handicapped. By insisting that NASA be the lead agency, both the panel and Teague himself shocked the existing agencies into realizing they had better not sit back and relax or their jobs and authority would be preempted by a more aggressive, newer agency. So the agencies started doing more themselves. Working with Brademas, Teague helped push through legislation to coordinate handicapped research, plus an interagency committee which represented all Federal agencies carrying on rehabilitation work. At Teague's suggestion, the Armed Forces, Federal agencies, and leading private employers were polled to determine their plans for hiring handicapped persons. In many other areas, Teague, Roodzant, and his staff worked on amending the social security law to allow recipients to qualify to use motorized Amigo wheelchairs, helped break down resistance to implementation of the new Transbus, thus enabling handicapped people to board intracity buses more easily; and continued his running assault on architectural barriers which hampered the handicapped in Federal buildings. On February 24, 1978, for example, Teague accused the General Services Administration, HUD, and the Department of Defense of violating a 1968 law mandating that public buildings be made more accessible to handicapped persons. Teague got quick action by stating:

The standards specified by public law have not been developed, the inadequate standards that were instead adopted have not been complied with and handicapped individuals are still denied free access to buildings that belong to them as well as every American citizen. We have talked too long. We have asked handicapped people to wait too long. We have not lived up to either the law or our moral responsibility.

From the top to the bottom, Teague made sure that every responsible Federal official was made aware that he and the committee both meant business. On March 22, 1978, Teague wrote to the President:

We have vast scientific and technological resources at our disposal; therefore, a program should be focused which blends our resources with the needs of the coun-

try's disabled. The time has come for us as elected representatives, and as a nation, to direct our energies in a manner reflecting our commitment to handicapped persons.

When the Washington Star published an article in April 1978, pointing out the obstacles a young disabled visitor encountered in visiting the Kennedy Center, Museum of History and Technology, and the Library of Congress, Teague fired off letters to the officials concerned to find out why action was not being taken to correct the situation. In remarks for the Congressional Record, Teague colorfully stated:

Maybe we could understand and appreciate this young man's plight, the dilemma which faces millions of elderly and handicapped citizens who visit or try to conduct their business in Washington, D.C., if we were to lose our parking spaces, restrict ourselves to wheelchairs for a week, and had to come crawling to the floor of the House of Representatives every time we had a rollcall vote.

Wherever Teague went, he looked at the effect of existing facilities on problems which handicapped people encounter, and then went to bat to correct them. When he encountered difficulties in airports for handicapped people to make connecting flights, he wrote to Frank Borman, president of Eastern Airlines and Representative Harold T. Johnson (Democrat of California), chairman of the House Public Works and Transportation Committee. When he heard about a Houston condominium designed especially for disabled people, he sent Roodzant and consultant Matthews down to make some tape-recorded interviews, and helped spread the gospel on the value of enabling the handicapped to enjoy "independent living" in good surroundings outside of institutions. If somebody had trouble boarding a train, he was after Amtrak to get them to live up to their literature advertising they offered assistance to disabled passengers. From all over the country, people wrote Teague about job problems, architectural barrier problems, or simple lack of understanding by people in authority, and all these letters were carefully answered and the situations usually straightened out by Teague or the committee staff.

SPACE-AGE TECHNOLOGY TO AID ELDERLY AND HANDICAPPED

Five Science Committee members also serving on the House Select Committee on Aging—Watkins, Lloyd, Mrs. Bouquard, Hollenbeck, and Dornan joined with Representative Claude Pepper, chairman of the House Aging Committee in a February 13, 1979, letter to Fuqua urging greater application of developing technology to aid the elderly and the handicapped. The letter urged joint action and joint hearings between the two committees, with emphasis on the work of NASA and the Department of HEW.

In a speedy and warm response, Fuqua on February 21 heartily endorsed the idea, suggested joint hearings in mid-July, and also proposed interim measures to encourage "aggressive cooperative efforts" by HUD and the VA as well as NASA and HEW. Following up with requests to these agencies, Fuqua joined the six signers of the February 13 letter in written requests to urge them to get started in working out the necessary cooperative relationships. The letter also stated:

It is important that a senior staff representative from each agency be responsible for developing, implementing and administering such plans and agreements.

The committee was pleased with the agency response, and in particular the enthusiasm which NASA displayed for the idea. In a followup letter on May 15, 1979, Fuqua told NASA Administrator Frosch:

Your appointment of Floyd I. Roberson to be NASA's representative will insure decisive action in this area over the coming months.

Fuqua noted that the joint hearings were scheduled for the week of the 10th anniversary of the first manned landing on the Moon, carrying great symbolism in the new drive to apply space technology to help alleviate the problems of the elderly and handicapped on Earth.

The crowded hearings on July 19-20, 1979, featured noted futurist and inventor R. Buckminster Fuller, NASA Administrator Frosch, National Space Institute President Hugh Downs and author Robert Heinlein, as well as representatives of other Federal agencies, private manufacturers and universities. In announcing the hearings, Fuqua stated:

The demands which are placed on our scientists and engineers in meeting the challenges of NASA's space missions will continue to keep this Nation on the leading edge of technology in many fields. We must, likewise, continue to insure that this technology is made available and not "log jammed" within the agency.

The committee leadership, and the effective efforts of staff members Roodzant and Clements and the committee consultants, resulted in great strides in research and technology to aid the handicapped. It was an area of clearcut accomplishment for the committee. It represented an expansion of jurisdiction under the heading of "special oversight" which proved to be significant.

Aeronautics and Transportation

"One of the more serious problems facing NASA in aeronautics is the growing and serious lack of new, young scientific and engineering personnel," declared Hechler in submitting a 1970 recommendation, accepted by the House, to reverse the "creeping age level" of NASA aeronautical engineers. Hechler's amendment added \$1.4 million to provide research fellowships, summer jobs, and scholarships to attract more young people into the aeronautics field.

The initiative of the Subcommittee on Advanced Research and Technology (renamed in 1972 Aeronautics and Space Technology) was directed at building strength for the future. As Hechler remarked to the House in presenting his subcommittee's portion of the 1970 NASA authorization bill:

I remind the House that the advanced research and technology program provides the reservoir of new technology for our aeronautics and space programs of the future. He pointed out that NASA had hired only 23 young college graduates in the aeronautics area in 1969 as against 179 in 1966. Pelly, ranking minority member of the Hechler subcommittee—a conservative on nearly every spending issue—strongly supported more emphasis on aeronautical research, as he told the House:

Whether we are talking about civil air transport, noise abatement, air pollution, safety, congestion, or improvements in aircraft themselves, we definitely need more research effort, intelligently organized and directed.

BIPARTISAN SUPPORT FOR AERONAUTICAL R. & D.

During the 1970's, a bipartisan group of committee members worked aggressively to expand the Nation's active effort in aeronautics and aviation. Hechler, Pelly, Wydler, and Goldwater were the most outspoken leaders in this area from 1970 through 1974, with Milford and Lloyd teaming up with Wydler and Goldwater to take the lead in the 1975-78 period. (See chapter IX for list of Hechler subcommittee members, 1970-74.) Harkin took over the subcommittee in 1979.

In its 1970 report entitled "Issues and Directions for Aeronautical Research and Development," the Hechler subcommittee issued a call for "a national aeronautics and aviation policy" (see pages 254-255).

The subcommittee succeeded in upgrading the status of aeronautics within NASA, and forcing greater emphasis in this area despite declining budgets in other areas.

Although money was the first yardstick the subcommittee applied to the NASA budget to confront the Administrator on why he wasn't spending a greater percentage on aeronautics, the subcommittee went far deeper into specifics. For example, in addition to the emphasis being placed on training more young aeronautical engineers, the subcommittee in 1970 added funds for the following:

Additional work in the area of flight safety, including work on aircraft wake turbulence, clear air turbulence, pilot warning indicators, air crew workload, and reducible noise and pollutants from aircraft engines.

The year 1970 was not a very good year for aeronautics. The March 1970 report of the subcommittee, to be sure, attracted wide attention and high commendation. But Miller was preoccupied with the intracommittee battle over the Shuttle in 1970 (see chapter VIII). Fortunately, the subcommittee had just completed a thorough set of hearings on aeronautics in December 1969. So when Miller decreed in 1970 that all NASA authorization hearings were to be conducted by the full committee, current data were still within the subcommittee's grasp. Nevertheless, aeronautics got the short shrift before the full committee. However, Wydler questioned NASA on the speed with which their aircraft noise research was proceeding, and Goldwater pressed hard for additional details on how a national air transportation policy was progressing. After NASA's aeronautical officials had described what NASA was doing at the request of the Department of Transportation and the Federal Aviation Administration, the following colloquy occurred:

Mr. HECHLER. Do you think, as long as NASA and FAA are independent agencies, that you can resolve this question by a joint study? Doesn't this require some type of national leadership from the highest level, in order to pull this thing together, and enunciate what the priorities are?

Dr. Low [NASA Deputy Administrator]. Mr. Hechler, all of my experience tells me that we should be able to do this between the Department of Transportation and NASA. I think we have a good example in the nuclear rocket program, where we are working with another agency, the AEC, and this is moving forward very, very actively. I don't see why the transportation problem cannot be resolved jointly between DOT and NASA.

Mr. HECHLER. Color me skeptical.

Mr. GOLDWATER. If I might just comment on politics, politics is a lot like milking a cow. In order to get something, you have to have a little pull. And I think perhaps Mr. Hechler's observation that we need national, from-the-top leadership, that might help cut through some of the problems that you will encounter between the conflicting interests.

Mr. CABELL. Being an old dairyman, I'd like to clarify the analogy that the gentleman used, and that is, the cow does not give milk. You have to take it away from her.

Mr. GOLDWATER. You still need that pull.

As one step toward that leadership, the subcommittee sponsored a bill, which was enacted into law, making the Secretary of Transportation a member of the National Aeronautics and Space Council.

When the NASA authorization bill reached the House floor on April 23, 1970, Miller put his main stress on rounding up enough votes to preserve the Shuttle against the attack led by Karth and Mosher. As a result, in his long statement about the NASA program, this is all he had to say about aeronautics:

I will not go into the many details needed to explain the extremely good work which is being performed by NASA in aeronautics and advanced research and technology.

Once again, when the NASA bill reached the crucial negotiations with the Senate, Miller as the leader of the House conferees did not appear to attach as much importance to the increases in aeronautics as he did other portions of the NASA legislation. Miller took the initiative to give up some of the increases. As a result, the conference wrote glowing words of support for all the extra work which NASA was supposed to perform in aeronautics within the limits of the reduced funding which made it very difficult to accomplish.



In 1971, Neil A. Armstrong as NASA's Deputy Associate Administrator for Aeronautics, was invited to give the Hechler subcommittee an informal breakfast briefing on recent developments in aeronautical research. From left, Hechler, Armstrong and Chairman Miller.

NEIL ARMSTRONG AND AERONAUTICS

In 1971, the subcommittee worked closely with Neil A. Armstrong, the first man to set foot on the Moon, who had been brought in by NASA to become Deputy Associate Administrator in charge of Aeronautics. In addition to the formal appearances which Armstrong made during committee hearings, Hechler arranged an informal breakfast for Armstrong and Astronaut William A. Anders (the latter at the time was Executive Secretary of the National Aeronautics and Space Council.) Despite the personal interest of these former astronauts in developing aeronautics, the subcommittee still felt that insufficient support was being given to the area. At a time of declining budgets and the squeeze on the space program, the subcommittee was insistent that more funds be allocated toward solving major aviation problems through aeronautical research and development. It was felt that the time had arrived to reorient NASA's program toward more practical benefits, and also to use the old NACA (National Advisory Committee for Aeronautics) expertise.

When Roy P. Jackson, NASA's Associate Administrator for Advanced Research and Technology, appeared before the subcommittee in 1971, he remarked:

I am aware that this subcommittee has, for many years, felt that the aeronautics program was less than it should have been. I can assure you that I am working and will continue to work toward aeronautics being properly postured with respect to NASA's total plan.

Brought in to testify before the subcommittee in 1971, in addition to Armstrong, were Drs. Hans Mark, Bruce Lundin and Edgar Cortright, the directors of Ames, Lewis, and Langley Research Centers, where NASA did the bulk of its aeronautics research. Cortright had this exchange with the subcommittee chairman:

Mr. CORTRIGHT. When I went to Langley 3 years ago I made a conscious effort to assess the state of health of our program within NASA and in the aeronautics industry both in this country and throughout the world and to rate our efforts against the total situation. To make a long story short, it seemed quite apparent to me that aeronautics had suffered somewhat from having taken a back seat to space and was due some increased effort, and I think that is the situation today.

Mr. HECHLER. That is the understatement of the year.

Mr. CORTRIGHT. Thank you, sir, I am glad you said that. * * *

Mr. HECHLER. You will find that this committee, unlike some committees of Congress, is not looking to where they can cut this program, but particularly in the aeronautics field we are looking for ways in which we can strengthen this program and ask why you aren't doing more than you propose to do. I think this sentiment is shared by people on both sides of the aisle of this subcommittee.

"WE ARE DETERMINED THAT THIS BE DONE"

Wydler pushed hard for additional, speeded-up work by NASA to proceed beyond the planning and study stage on aircraft noise suppression, the short takeoff and landing plane (STOL) and greater study of the airport as an integral part of aeronautics research. Pelly set the stage for committee action by noting that the \$110 million requested for aeronautics was "totally inadequate," and he added that "year after year members of this committee have spoken for greater emphasis on research." As the subcommittee approached the end of its hearings, Hechler concluded:

Just one final note before we adjourn. We have always considered the Office of Advanced Research and Technology as the necessary reservoir for replenishing the strength of the space and aeronautics programs for the future. I would like again to return to the point of the necessity for emphasizing getting younger people into the aeronautics program. * * * This committee is determined that this be done. If there be any difficulties in the way of accomplishing this, I hope we won't wait a year and simply have NASA come in and report and say, sorry, some other law prevented us from doing it. Let us know. Keep in touch with us. We are determined that this be done. We want to encourage you and spur you to carry this out.

Wydler dramatized the situation through "Additional Views" appended to the full committee report in 1971. He commenced by pointing out:

The great emphasis placed on the space program during the early 1960's led to remarkable achievements. However, one of the prices we paid for this progress in space was the "shortchanging" of attention to aeronautical research and development. As the implications of this became clear, the committee began to press NASA to place more attention upon aeronautical problems.

Wydler noted that by the latter 1960's, aviation problems had reached the "crisis stage." He identified the most critical areas as noise pollution, and airway and airport congestion. He added that both NASA and the FAA must tackle with greater vigor these immediate problems to avoid chaos. He reiterated that "the design of aircraft is inextricably related to the design of airports and airway patterns."

INCREASES IN 1971

When the markups of the bill took place, the subcommittee decided to spell out in great detail precisely how it was intended to spend an additional \$25 million, and \$1.4 million was added specifically to encourage graduate research and the expansion of opportunities for younger aeronautical engineers to be employed by NASA. Wydler noted during the hearings the need for a study of "wetports"—off-shore airports to serve urban areas, and he incorporated an amendment

to allocate \$500,000 for this purpose. The STOL research, for which NASA had budgeted \$15 million, was increased to \$22 million, and other increases were voted for aerodynamics and vehicle systems, propulsion, operating systems, materials and structures, and guidance and control systems. All of this increase of \$25 million survived in the House consideration of the bill except the study of wetports. A floor amendment knocked out this provision after a fight led by midwestern Congressmen apprehensive about building such an offshore airport in Lake Michigan.

In the 1971 conference committee, another battle was carried on with the Senate over funding aeronautics. This time, in splitting the difference, \$12.5 million of the increase was preserved in conference. The subcommittee was pleased that the conference report included a stipulation that the additional funding be spent on the following:

Noise abatement, congestion, safety and the need to attract new, younger scientists and engineers into aeronautical research and development.

HEARINGS ON THE CARD STUDY

The year 1971 also marked the publication of the joint DOT-NASA study on "Civil Aviation Research and Development" (popularly known as the CARD study). The subcommittee lost little time in coming to grips with the recommendations in that study. During January 1972, the subcommittee scheduled extensive hearings on the conclusions and recommendations of the CARD study, which had confirmed what the subcommittee had been saying for years that noise and congestion were top priority problems. In addition to high Federal officials (NASA Administrator Fletcher, Under Secretary of Transportation James M. Beggs, and Defense Department officials), the subcommittee heard testimony from the Aerospace Industries Association of America, the Boeing Co., the Airport Operators Council International, the General Electric Co., Pratt & Whitney Division of United Aircraft Corp., the Air Transport Association, United Air Lines, Douglas Aircraft Co., Lockheed Aircraft Corp., McDonnell Douglas Corp., Grumman Aerospace Corp., National Air Transportation Conference, Aircraft Owners and Pilots Association, National Transportation Safety Board, Air Line Pilots Association, AVCO Systems Division, and the Raytheon Co. It was an impressive cross-section of anybody and everybody who had anything to do with aircraft, airports, and aeronautical research from all angles.

Hechler opened the hearings by pointing out:

We have been pushing papers and trying to solve today's aviation problems with yesterday's technology. Over the past decade in NASA, the space tail has wagged the dog in the neglect of aeronautical research. * * * This committee has consistently

and persistently advocated increased support for aeronautics. We have also advocated a greater status for aeronautics within the administrative structure of NASA.

The hearings attracted overflow crowds of interested officials, representatives of aerospace companies, and the general public -90 percent of whom came early and stayed late. Hechler convened the hearings every day at 9 a.m. and they ran frequently past 5 and 6 p.m. (one did not adjourn until 6:45 p.m.) with only a break for lunch. Attendance and participation of subcommittee members was unusually high.

NEW NAME FOR THE SUBCOMMITTEE

He also read a January 14 letter from NASA Administrator Fletcher, announcing that the name of the Advanced Research and Technology Office had been changed to Office of Aeronautics and Space Technology. Hechler then announced his subcommittee's name change to Subcommittee on Aeronautics and Space Technology.

Miller and Mosher, chairman and ranking minority member of the full committee, dropped in on the hearings. Miller warned glumly:

Unfortunately, this matter is one that falls into the jurisdiction of several committees here on the Hill, as you know. Our committee interest is by virtue of the fact that NASA is the successor to NACA, and the scientific phases of this succession are ours. We have to bear very seriously in mind that we cannot overlap the fields of other committees.

Mosher was a little more optimistic:

I am sure that I speak for all the Members on our side of the aisle when I say that we are pleased to see what we see here and feel what we feel here. Frankly, I am a little bit surprised at this standing room only crowd, the fact that Jim Gehrig from the Senate (Aeronautical and Space Sciences) committee is over here with us, and the unusually excellent attendance of members of the subcommittee. This all bodes very well, I think, for the hearings that you have initiated.

The hearings did prove to be very productive. In volume alone, the record extended to 942 pages. As a followup to the hearings, the subcommittee issued a massive 283-page report. Hechler's letter of transmittal stated:

There is little doubt that the civil aviation industry continues to be a vital segment of the U.S. economy. However, unless we, as a Nation, make a determined effort to solve the problems identified in the CARD study and earlier reports of this subcommittee, the future success of the civil aviation industry could be placed in jeopardy.

Public interest in the hearings continued to run high, and they were crowded daily with aviation enthusiasts. The preparation for the hearings and the report which was published constituted a model of effective and efficient staff work by Bill Wells, Joseph Del Riego, and

Mrs. Patricia Schwartz. Among the recommendations of the subcommittee were the following: The need for a national aeronautics and aviation policy; substantial funding increases required in noise abatement, aviation safety, propulsion, and general aviation; military and civil aeronautical research and development might be brought closer together; an Office of General Aviation should be established within NASA; urgent attention should be devoted to the safety and crash survival aspects of aviation.

NEED FOR A CLARION CALL OF NATIONAL LEADERSHIP

When the 1972 authorization hearings got underway in February, the subcommittee had a good headstart in aeronautics, having just completed the special oversight hearings on aeronautics less than one month before. Hechler opened the hearings by reading a January 20, 1972, letter he had written to President Nixon:

There is a need for a clarion call of national leadership on aviation problems—in particular, noise, safety, and congestion. I would hope you could mount a national offensive to mobilize the necessary resources and focus attention on the critical need for aeronautical research and development in these and related aviation areas. Research, the cutting edge of progress, is being neglected. In the area of general aviation where there will be tremendous growth, we are slipping behind. We need leadership in both short-haul and long-haul aircraft development.

As the hearings opened, Hechler said:

Now I have some "good news" and some "bad news." First, the good news. An Assistant to the President replied promptly to my letter. And now for the bad news. I got a form letter. And having worked at one time as an Assistant to the President in the White House, I have participated somewhat in the distribution of form letters that come from the White House.

Hechler read the letter from William E. Timmons, Assistant to the President, which included the familiar stock phrase of a form letter:

You may be assured your views will be brought to the President's early attention and also shared with the appropriate staff members.

Timmons mentioned various projects which the Federal Aviation Administration was undertaking in the area. Hechler told the hearings that unfortunately the letter said nothing new, and he deplored "the fact that the main point of my letter, the need for a clarion call for national leadership, was missed or ignored." He added:

The people and the Congress will no longer tolerate "penny ante" solutions to aircraft noise, congestion, and safety. We must have a ringing, unmistakable call for vigorous leadership in these areas by the President.

The subcommittee was quietly pleased that NASA had come in with a request for \$163.4 million for aeronautics—which was nearly

\$50 million more than they had spent the prior year. The subcommittee decided it was time to start offering substantial rather than moderate increases in this vital area, and upped that request to \$211,890,000—a whopping addition of \$48,450,000. The subcommittee was unanimous in its vote. Wydler and Pelly led the crusade at all stages of the unusually strong effort.

HECHLER BIDS GOODBYE

At the full committee markup session on March 22, Hechler bade goodbye to the committee on which he had served for 13 years. He told the committee that since his congressional district had been abolished, it would be impossible for him to survive the 1972 primary in May 1972. Noting the increase of close to \$50 million his subcommittee was bringing in for approval, at a time when other subcommittees were holding the line, Hechler told the markup session: "We might as well go out with Roman candles." Wydler was sympathetic:

I hope your prediction or statement that preceded the report of the committee turns out to be untrue, because I personally found it to be a pleasure to work with the gentleman on the subcommittee, and it would be a great loss to the Congress and to the country if your prediction did come true.

Hechler, who had been born in Wydler's district, replied: "I may move back to Long Island. You had better watch out." Wydler responded: "That's all right. Just don't run in my district." Other committee Democrats quietly counted what seniority positions they would have once the third-ranking Democrat was gone. (Actually, he did not leave for another four years.)

After the jocular interchanges had been completed, Wydler went on to make a strong case for a \$41 million add-on the subcommittee had voted to speed by one year the retrofitting of the existing air fleet. He sponsored a special tape-recorded demonstration which dramatically brought home to the committee the difference in aircraft engine noise levels which could be achieved. Wydler pointed out that the additional funds would not add to the total cost, but would simply mean spending more of the money sooner, thereby speeding up the attainment of the goal. He added:

There is good reason to believe that most of these funds can be recovered by the Federal Government when we finally get around to some means of financing the retrofitting program that is going to result from this. It is obvious that the passenger on a plane is going to have to pay for this in one fashion or another, whether it is a new tax or an increased fare; and that is perfectly proper.

Seiberling asked Wydler how OMB was going to treat this budget-busting move. Wydler responded:

The only thing that I can tell you is that I am working on it. I am trying to convince the people in the Administration at a level which is high enough to make some

difference to agree—and that means at a level higher than OMB obviously—that this program is in the national interest.

SHOULD NASA OR FAA PAY FOR RETROFITTING?

Mosher was the first to raise a serious question:

Now Jack Wylder says that the technology exists, it is already here. I have always assumed that NASA's job was to research and develop the technology, but once that it existed, as in this case, I thought the FAA would take over, or the FAA and private industry would take over. So I am curious to know what NASA's responsibility is in it.

Wells carefully explained that NASA had a sound record of 3½ years of research done with funds recommended by the subcommittee, which brought the quiet engine project to a level of confidence where it would work. Then Wells had a happy thought. He pointed out that the work was being done by the General Electric Co., "which is under the Lewis Research Center." It was as though a light bulb had suddenly appeared, as Mosher commented: "And this research center is located in northern Ohio?"

Mosher abruptly ceased taking issue with the \$41 million increase. Not so an outspoken Kansan. Winn fought the proposal vigorously. He wondered why FAA was not footing the bill, instead of NASA. When Hechler indicated that the FAA would probably pick it up the following year, Winn asked why they couldn't just as easily assume the cost in 1972. At this point, Hechler revealed that he had arranged a private, off-the-record meeting with the FAA Administrator, John H. Shaffer, who when informed of the impending action of the subcommittee had endorsed the concept. Winn then challenged the proposal on the grounds that we could not control foreign planes which did not meet the noise standards at American airports. The arguments got warmer as Price jumped in against asking NASA to foot the bill, and Goldwater spoke out in favor of the \$41 million increase. Winn finally demanded a rollcall, and the subcommittee position prevailed, as it did on the floor. These subcommittee actions laid the basis for later initiatives by both Congress and the executive branch to develop major aircraft retrofit programs, in order to reduce noise levels by significant amounts.

The spirited argument over retrofitting almost obscured other increases which the subcommittee voted in 1972. For example, funds were added to speed research in modifying civil aircraft to be compatible with a new microwave landing system (MLS) being developed

by the FAA. In 1972, this issue had none of the factors which tore the subcommittee apart five years later. More funds were provided to increase collision avoidance instruments in general aviation aircraft.

Winn did not give up easily on the aircraft noise issue. He blistered the subcommittee in "Additional Views" attached to the 1972 committee report, noting:

Perhaps in our zeal to deal with a pressing national problem, we have imposed an unnecessary burden on NASA which should more appropriately be borne by several different government agencies and the airline industry.

WHY DOES THE SENATE SHORT-CHANGE AERONAUTICS?

The usual fight occurred with the Senate when the conferees assembled. The House conferees could never figure out why, in light of the pride which the Senate committee took in having initiated the CARD study, the Senate conferees fought so hard against increased funding for aeronautics. In 1972, it was an unusually close fight, because Senator Goldwater sided with the House conferees. Even so, when the smoke had cleared, the conferees once again split the difference and agreed on a \$24 million increase for aeronautics, instead of the House position of double that amount. The sequel is that the House and Senate appropriations committees agreed not only to fund this entire amount but also to earmark the \$24 million exclusively for retrofitting existing aircraft with the quiet engine. Then the nasty old OMB came along and impounded the funds, after all that work.

The impounded funds, however, were available the following year, as NASA came in with an aeronautics budget of \$171 million—only \$7.6 million above the prior year request including the impounded funds. At the same time, projected future costs for aeronautics seemed to be at a fairly stable, or declining level. This prompted Hechler to ask NASA Administrator Fletcher as the 1973 full committee hearings opened in March:

It would seem to me that with this very, very sharp decline projected for aeronautics over the next few years we really ought to change the name of NASA and take the first "A" out of there. As you know, this committee and the Congress have very strongly supported additional emphasis on aeronautical research and development and the very simple question I would like to ask you is: Where are we going in this Nation in aeronautical research and development? Why are we slowing down? It would almost seem from these figures that we are going underground.

Dr. Fletcher responded: "Aeronautics will continue to grow, and will be emphasized."



Representative John W. Wydler (Republican of New York), a leader in emphasizing aeronautical R. & D., took a strong interest in the progress of other nations in this field. Above, Congressman Wydler is shown inspecting a new Israeli jet.

WYDLER AND GOLDWATER MAKE THEIR PITCH

When Wydler's turn came, he pitched in:

Dr. Fletcher, you heard Congressman Hechler's question regarding aeronautics. What I would like to discuss with you is the question of whether we are treating aeronautics fairly in the Federal Government. * * * I don't really think that aeronautics and the space program are the same, although they are treated as part of the same agency. * * * But by comparing it to the other programs within your agency, we may be doing it a disservice in our budgetary matters.

Dr. Fletcher insisted he was coming in with a 13-percent increase for aeronautics, although Goldwater adroitly pointed out that the only way this could be considered an increase was by factoring in the funds which had been impounded and released.

Goldwater also asked the NASA witnesses how they could square the logic of canceling the quiet engine-short takeoff and landing plane named "QUESTOL" one year after extolling the virtue of investing in its development. This turned into one of the big issues of 1973, with NASA taking the position that Air Force work in that area made QUESTOL unnecessary. The subcommittee disagreed. Symington, Hanna, and Parris joined in the strong support voiced for QUESTOL. Symington, although not on the subcommittee, was the most dogged questioner:

Mr. SYMINGTON. Has DOT taken up this challenge? Are they investing their commensurate sums to make up for NASA's dropping (QUESTOL)?

Dr. FLETCHER. DOT is in a state of flux at the moment. The leadership has changed. FAA leadership has changed, and so it is going to take them a little while to get back on their feet.

Mr. SYMINGTON. Well, of course the leadership changes, but we are talking about great truths, aren't we? They run like a steady stream through the bureaucrats who tell the new leaders what is happening.

When NASA officials reiterated how important QUESTOL technology was, Symington wanted to know why then had \$26.4 million been cut from the budget:

Somehow the magic of your program continues without any money. If we could do that with the Shuttle, think how much we could save.

As the subcommittee moved into more intensive consideration of the aeronautics funding for NASA in 1973, Hechler reflected on the failure of the committee in the late 1950's to place more funding into aeronautics "when the tremendous emphasis on space tended to push aeronautics and support thereof into the background." He said that although encouraged by remarks made by Dr. Fletcher in prior years, "this year it appears there is less to be encouraged about." He hastened to point out:

And by mentioning Dr. Fletcher, the Administrator of NASA, I do not intend to indicate or infer that it is his sole responsibility that some of these reductions have been made.

Nineteen hundred and seventy-three earmarked the first year that Wydler moved up to take over Pelly's slot as ranking minority member of the subcommittee. Wydler made these observations as the subcommittee hearings got underway:

My general reaction to the aeronautics situation, Mr. Chairman, is that we are not making progress in this area at all. I know how hard you have personally worked over the past few years to try to get some type of support for a strong aeronautics program within the Federal Government. I realize we apparently have made some progress—at least it looks like that in the past few years—but the present budget when you analyze it cuts out the one major project we had for the future, which was the QUESTOL project. * * * One thing you have accomplished, I think, and which this committee has accomplished has been to get a lot of people in the Government and on commissions to agree that civil aviation is not being treated properly and is not being given the importance it should get. * * * Perhaps the hearings will bring out something more hopeful than this very grim and pessimistic-sounding analysis which I have just given of this year's aviation R. & D. budget.

SUBCOMMITTEE CHAIRMANSHIP AS A SHARED EXPERIENCE

In 1973 Hechler revived a practice which he had begun in the early 1960's when he first became a subcommittee chairman—to allow

various subcommittee members, both Democrats and Republicans, to chair different subject matter areas being handled by the subcommittee. This practice encouraged every member of the subcommittee to bone up more actively on the subject matter over which he was billed to preside. It stimulated a greater sense of unity in the subcommittee, with every member sharing some responsibility. It afforded a chance for freshmen members to gain the experience which they otherwise would not enjoy for many years. Needless to say, the practice was especially popular among the Republican members, who never had the opportunity to chair any session as long as the Democrats controlled Congress which was during this entire period. On the negative side, one observer, James R. Kerr, in his Stanford University Ph. D. dissertation, remarked that the practice of rotating subcommittee chairmanships resulted in spotty differences in the information elicited and the oversight exercised. Staff Director Ducander did not like the diffusion of authority which made his job more bothersome, since every member had a different style. It is evident that Ducander's complaints to Miller prompted him to direct Hechler to cease the practice, which Hechler resumed after Teague became chairman in 1973.

When he announced the new practice, Hechler observed:

I think one of the ways that the seniority system can be improved is by recognizing the fact that all Members of Congress are equal and that we have a tremendous amount of talent available among all Members.

In the 1973 hearings, Hechler divided up the responsibilities of the subcommittee as follows, with the members presiding over these subjects:

Cotter—General overview of aeronautics.

Davis—Short-haul aircraft development.

Pickle—Noise control.

Goldwater—Supersonic technology.

Parris—General aviation.

Thornton—Space nuclear power and propulsion.

Conlan—Research and program management and construction.

Wydler—Tracking and data acquisition; closing session on aeronautics.

One day while Goldwater was presiding, Mosher exercised his prerogative as ex officio member of the subcommittee, by reason of being the ranking minority member of the committee, and dropped in on the hearing. Turning to Hechler, seated over at the side, Mosher started the following interchange:



Representative Barry M. Goldwater, Jr. (Republican of California) urged more emphasis on aeronautics, in remarks at Langley Research Center, Virginia, October 30, 1973.

Mr. MOSHER. Mr. Chairman, may I say one word?

Mr. HECHLER. You will need permission of the Chair.

Mr. GOLDWATER [presiding]. Mr. Mosher.

Mr. MOSHER. I rushed in here particularly because I heard of this innovative departure from custom, Mr. Hechler, that you are going to establish the custom of allowing rotating chairmanships, including minority members. I want to salute you for it.

Mr. HECHLER. I wouldn't want the gentleman from Ohio to get the idea that this is going to be permanent after the next election.

Mr. MOSHER. Barry and I can continue to hope, at least, can we not?

Mr. GOLDWATER. I don't mind serving in an apprenticeship position, looking forward to greater expectations.

Mr. MOSHER. I wanted to be here on such a happy occasion. I salute you, and I salute Congressman Goldwater. This is a good experiment. I am all for it.

Mr. GOLDWATER. After I finish, I am not so sure Mr. Hechler will agree.

The 1973 hearings, including the entire Aeronautics and Space Technology Office, ran 1,319 printed pages. As they came to a close, Wydler addressed Roy P. Jackson, NASA Associate Administrator for Aeronautics and Space Technology:

I would like to make a couple of clarifying statements for the record on my own behalf. Early in these hearings, I made a general statement to the effect that the

aeronautics program had been pretty well * * * blown apart. * * * My feeling has changed considerably after listening to the testimony that you presented to this committee and I feel * * * the aeronautics presentation before the committee was the finest I ever witnessed.

But Wydler once again deplored the "steadily declining emphasis on aeronautics." He concluded:

It seems to me by the time you reach 1978, you might as well drop the word "aeronautics" (from NASA).

YOUNG SCIENTISTS AND ENGINEERS APPEAR IN 1973

An interesting and informative feature of the 1973 hearings was the appearance of young scientists and engineers from each of the centers where the Aeronautics and Space Technology Office was doing work—Ames, Langley, Lewis, and the Flight Research Center. These young engineers and scientists described the work they were doing, underlining the value which the subcommittee placed on the recruitment of more persons of their type. Also appearing before the committee at Mosher's recommendation was Dr. John V. Dugan, Jr., a young research physicist at Lewis Research Center, who subsequently joined the committee staff to work in several different areas, including energy.

When the subcommittee had its markup, it came in with a \$34 million increase for aeronautics, \$20 million to restore work on QUESTOL—the quiet experimental STOL aircraft, and \$14 million for aircraft noise abatement, to restore the refan retrofit program for the DC-8 and 707. When the full committee met on April 17, 1973, Hechler had another piece of good news: NASA had decided to follow the subcommittee's 1972 recommendation and set up a separate Office of General Aviation. But Hechler also reported:

Members of the subcommittee and other Members registered strong dissatisfaction with the continuing relatively low level of funding for aeronautics. Strong objections were expressed about the termination of programs considered vital to solving the severe problems of aircraft noise, safety and congestion.

By line-iteming specific increases, the subcommittee hoped that this would force the necessary flight testing required for FAA rulemaking on JT-8D-powered aircraft, as well as added funds for JT-3D refan retrofit.

GETTING THE AGENCIES TO COORDINATE

During the period when the subcommittee held annual authorization hearings, which usually involved appearances by NASA, Department of Defense, DOT, FAA and outside witnesses, the subcommittee

carried on a vigorously active program of oversight. In December 1973, a 3-day hearing was held on aircraft noise abatement including the Environmental Protection Agency, which under the Noise Control Act of 1972 had been empowered by the Congress to make recommendations on the aircraft noise regulations of the FAA. Until the Bolling-Hansen congressional reforms took effect in 1975, the committee had jurisdiction over only the NASA aspects of research and development. The subcommittee interpreted its role as broad enough to ascertain the adequacy of NASA's efforts through clarifying the interrelationships with other agencies. These oversight activities helped lay the groundwork for expanding the committee's jurisdiction over the entire field of civil aviation research and development in the Bolling-Hansen reforms.

The subcommittee was concerned, as expressed by Cotter, "that there may be a growing mismatch between the results of the NASA technology and the FAA rulemaking." Cotter appealed to OMB Director Roy Ash not to abandon the aircraft noise effort by cutting off funding of NASA refan retrofit technology on the JT 3D powered aircraft (DC-8 and 707). A response came from the Congressional Relations Office of OMB, indicating that the JT-3D program would entail an \$800 million retrofit program, and there was little economic incentive for the airlines to make such equipment purchases. Wydler, who had had a great deal of experience with dealing with OMB, commented:

I think we might be a little better off if we could get OMB out of the picture rather than getting them in on the management basis.

An extremely useful aspect of the December 1973 hearings was that all agencies as well as the aircraft industry were brought together in one room and required to relate in detail the extent of the interrelationships and coordination in the complex aircraft noise field. It almost seemed at times that there was insufficient direct conversation among different agencies, and with private industry. The subcommittee performed a useful function in airing the way in which the different pieces of the aircraft noise picture fit together, and exposing obvious flaws which demanded correction. All of the major issues related to aircraft noise were brought out in the oversight review. As noted earlier, this formed the groundwork for major proposals to retrofit the civil aviation fleet.

For example, one result of the subcommittee inquiry was the formation by the EPA of an ad hoc "Aviation Noise Control Requirements Study" group. The subcommittee commended EPA for this action and urged NASA to participate in an aggressive manner, which was done.

THE SHOTGUN MARRIAGE

Wylder, the most outspoken advocate of quick rulemaking action by FAA and continued funding of NASA technology, clarified the issue when he pointed out that NASA's investment would be thrown down a rat hole unless FAA put it into effect through its noise reduction rules. Dr. Fletcher, in a 1978 letter to Teague, recalled that "committee members sometimes (were) attempting to drive a wedge between FAA and NASA." Actually, the subcommittee was trying to bring the two agencies together and the shotgun marriage did not quite work out. As Wylder predicted, NASA produced the technology FAA did not apply it, and the results were inconclusive. Dr. Fletcher commented in 1978:

A side effect of all this, however, was that a good many of the new planes that are now being produced in the United States (and unfortunately France and England) are using this new technology and ultimately all planes will be quieter.

In February 1974, the subcommittee held oversight hearings on the possible use of hydrogen as aviation fuel, and also inquired into fuel conservation and current developments in supersonic technology. Hechler authorized Goldwater to preside over field hearings on these subjects in Los Angeles. The committee produced two reports on these issues at the end of 1974: "Aviation Fuel Conservation Research and Development" and "Hydrogen as an Aviation Fuel." In a letter of transmittal, Hechler noted:

By combining various technological advances, NASA suggested by the early 1980's fuel savings approaching 30 percent should be possible in advanced aircraft. Longer range technology offers the potential of a saving of 50 percent over today's wide-body aircraft.

HYDROGEN AS AVIATION FUEL

"The promise is bright, but the problems are enormous" concluded a subcommittee report on hydrogen as an aviation fuel. As a direct result of the February hearings and oversight, the committee recommended an increase from \$755,000 to \$1,410,000 to investigate the problems and prospects of liquid hydrogen as an aviation fuel. These additional funds were pointed toward such difficulties as fuel tank insulation and the compatibility of materials with liquid hydrogen.

The subcommittee also added \$1.6 million to the NASA request for aviation safety research, pinpointing that these new funds should be used in such areas as clear air, storm and wake vortex turbulence, and fire technology. The longtime interest of the subcommittee in general aviation stimulated the addition of \$2 million, with emphasis on making general aviation safer, more reliable, and more competitive in world markets.

After a number of battles over the years with the Senate, which had traditionally funded a much lower figure for aeronautics, the joyful news arrived in 1974 that the Senate not only had adopted all of the House increases in aeronautics but also had added \$1.1 million on top of that for "supersonic research technology." This made it an easy matter to "give in" to the Senate increase, in contrast to the bloody confrontations of past years which usually ended in stalemates and the splitting of the difference. The phrase "supersonic research technology" was one which always caused some trouble on the House floor as some Members were apprehensive that it connoted a revival of the supersonic transport plane which had been killed by a vote of Congress. This item was annually challenged by Representative H. R. Gross (Republican of Iowa), and in recent years by Representative Ted Weiss (Democrat of New York), without success. NASA's research was concentrated on providing an advanced technology base for possible future civil and military supersonic cruise aircraft, as well as data on economic and environmental impacts of present and future United States and foreign supersonic cruise aircraft.

In the final year of Hechler's chairmanship of the subcommittee in 1974, two more sets of hearings were held and reports issued in the area of general aviation and aircraft noise abatement. They represented a continuing pressure in these areas to expand research and development to focus greater attention on the problems and potentialities involved.

GENERAL AVIATION

The oversight hearings on general aviation were held on May 14 and 15, followed by a field trip to general aviation manufacturers in Kansas on May 31 and June 1, 1974. The hearings were made more meaningful through the active participation of two general aviation pilots serving on the subcommittee, Goldwater and Parris. Two full committee members who took part in the hearings lent their expertise as pilots—Milford and Cronin. Parris chaired the hearings. The subcommittee concluded that much of the technology in the 1970's had been developed through the leadership of the National Advisory Committee for Aeronautics (NACA) in the 1930's and 1940's, necessitating an updating and concentration on new technological breakthroughs to keep pace with future demands in such areas as noise, safety, and exhaust emissions. The subcommittee had long felt that general aviation was being treated as a stepchild by NASA. Having spurred NASA to give more visibility to the general aviation R. & D. program through the establishment of a separate office, the subcommittee continued to exert leadership toward more emphasis in this area.

WHO IS IN CHARGE OF NOISE ABATEMENT?

Among the last reports forwarded to Teague by Hechler, drafted primarily by Bill Wells, was the analysis of aircraft noise abatement published in December 1974. This report recognized the very complex interacting factors of public health and welfare, economics, and technology. The subcommittee positively recommended more implementation of the "two-segment approach" to minimize noise, supported by some pilots but generally opposed by the Air Line Pilots Association as a threat to safety. One of the major recommendations was that more effort be made to produce a truly coordinated national aircraft noise abatement program. This point was repeatedly stressed by Hechler. He characteristically assembled the representatives of NASA, FAA, EPA and the Department of Defense around the table and then asked them whether each of them still believed, as they had frequently stated in the past, that noise abatement deserved top priority. Having received affirmative answers, Hechler then observed that since the demise of the National Aeronautics and Space Council, and the Office of Science and Technology, "there is no central responsibility or leadership to insure that all the different parts of the civil fleet retrofit program are really pulled together and coordinated. Who is in charge?"

There was an embarrassed silence. Alvin Meyer, EPA's Deputy Assistant Administrator for Noise Abatement and Control, was the first to break the ice:

Congressman Hechler, let me see if I can answer since there seems to be some degree of need for somebody to step forward and make a forthright statement.

But despite the clarification, EPA did not emerge as being completely in charge. Hechler followed up with this observation:

Somewhere along the line the responsibility and leadership seems to be falling between agencies, and slipping down without moving forward. Just what can be done to provide a catalytic agent or move this whole operation forward?

FAA Administrator Alexander Butterfield, who had startled a Senate committee and the world with his candor about the White House taping system, offered this road map on the situation:

Without question, if you had a Czar, the program would move more quickly than when it depends on the agencies cooperating with each other and coordinating their efforts. There is no single Czar. I know EPA consults with FAA which sets the standards. We determine what must be done in a particular area and go to NASA for the research portion. I am not telling you anything you don't know. That is the way so many programs are carried on between agencies. This requires the three agencies to work together.

Wylder chaired the final 1974 hearings on aircraft noise, and furnished many of the ideas which were incorporated into the final report.

On October 9, 1974, the subcommittee met to conduct a freewheeling markup session to finalize the language of the reports. Hechler told the subcommittee:

I want to make sure all members of the subcommittee realize that as of 11:00 last night our subcommittee got some wonderful new jurisdiction. I think all members of the subcommittee ought to give some thought as to the implication of the Hansen Committee and its recommendations which were written into House rules last night so far as our subcommittee is concerned. * * * We have taken from the Interstate and Foreign Commerce Committee full jurisdiction over all R. & D. that relates to civil aviation.

BROWN AND THE INTERNAL COMBUSTION ENGINE

Before 1975, ground transportation was excluded from the jurisdiction generally carved out for the subcommittee which handled Aeronautics and Space Technology, including advanced research. This issue was confronted when Brown introduced legislation, cosponsored by McCormack and Symington, to authorize NASA to conduct research and to develop ground propulsion systems which would serve to reduce the level of energy consumption. Subsequently, 101 cosponsors stepped forward to endorse the Brown bill, including two-thirds of the members of the Science Committee. The bill could have gone to any one of four subcommittees: Science, Research and Development; Space Science and Applications; Energy; or Aeronautics and Space Technology. Teague finally made the decision to refer the bill to Symington's Subcommittee on Space Science and Applications, where hearings were held in February and June 1974.

Brown's inspiration for drafting the new legislation grew not only out of the requirements of the Clean Air Act, but the realization that the internal combustion engine "is the largest source of air pollution in the United States." Brown's concept was to charge NASA with developing an alternative which would not be adverse to public health, would expend less energy, and would operate at higher efficiency. As the lead-off witness before the Symington subcommittee, Brown pointed out that Japan and Germany were really beating American manufacturers to the punch with light-weight, high-powered engines which were more fuel-efficient and less polluting. He noted that Mr. Honda "had a sixth grade education, and none of the resources available to General Motors to help him develop these things." He added:

If this legislation did no more than prod our own industry to move rapidly it would be a useful piece of legislation.

Bergland (the future Secretary of Agriculture) expressed some impatience with the lack of enthusiasm of the administration for a bill

which might help solve some of the critical fuel problems confronted by farmers and those living in rural areas:

Most of us here today will live long enough to see the end of petroleum used for fuel. It is much too precious to be wasted this way and it will be needed to equip and stock the petrochemical industry. I think this is an absolute certainty. My disappointment is that more is not being done at the Federal level in coordinating various alternative energy sources, power sources, that do not rely on petroleum.

WAITING ON ERDA

The classic response, with the gray eminence of OMB in the background, came in EPA's official rejection of the Brown bill. In a letter to Teague on February 11, 1974, EPA laid down the administration line, which was that everything must wait organizationally until the establishment of the Energy Research and Development Administration (ERDA). The official line was:

(The Brown bill), by enabling NASA to establish its own automotive research programs, separate from those of other agencies, would only further segment existing efforts and trigger an undesirable inter-agency competition for available funds and manpower. Accordingly, since we find (the Brown bill) ill-advised from an organizational standpoint, we do not favor its enactment.

Brown's response to this form of myopia was restrained when he addressed the issue in the June hearings on his bill:

I am somewhat concerned that administrative questions will obscure the fact that the existing ground transportation system in the United States is near collapse. This system is based upon the private automobile, which itself is based upon the energy-consuming and pollution-plagued internal combustion engine.

Brown could see little prospect that Detroit would take any initiative to move toward solution of the problem, either of pollution or fuel conservation, without Federal development of demonstrated technology and some prodding. Brown told the Symington subcommittee:

The impact of the automobile upon the American economy is too pervasive and too important to trust the future of our Nation to the decisions made in Detroit. Symington was equally pessimistic that a solution could be found in agencies like the Department of Transportation. He summarized:

We asked the Department of Transportation what they thought of Mr. Brown's bill, and what they thought their obligations were with respect to the automobile industry. They testified they think it is up to Detroit to make the innovations necessary to conserve fuel. * * * The Department of Transportation apparently believes that the automobile industry even in its narrow interests will somehow address itself to the needs of the 1980's. * * * We are skeptical.

The hearings afforded an opportunity to get a glimpse of what was being done by NASA already on a small-scale experimental basis at such research centers as Lewis and the Jet Propulsion Laboratory. JPL Director Dr. William H. Pickering briefed the committee on

successful experiments being carried out on hydrogen fuel injection for automobiles, resulting in higher efficiency operation.

The tremendous success of the NASA investment in aeronautics spurred a comparable interest in applying NASA expertise toward developing fuel-efficient automobiles and other forms of ground transportation. It is unfortunate that this noble effort did not proceed up the arduous legislative trail to the summit of enactment in 1974. The Brown-Symington-McCormack bill attracted a lot of public attention and mustered widespread congressional support, but did not go beyond the subcommittee stage (see also page 799 and chapter XIX).

A NEW SUBCOMMITTEE CHAIRMAN

At the start of 1975, Hechler's decision to take over the Fossil Energy Subcommittee opened the way for a new chairman to handle a vastly strengthened subcommittee which was renamed at the start of the 94th Congress as "Aviation and Transportation Research and Development." Representative Dale Milford of Texas, 10th-ranked member of the Science Committee took over the new subcommittee. Only 10 members bid for membership on the Milford subcommittee, as follows:

Democrats

Dale Milford, Texas, *Chairman*
Robert A. Roe, New Jersey
James H. Scheuer, New York
Tom Harkin, Iowa
Jim Lloyd, California
Tim L. Hall, Illinois
Richard L. Ottinger, New York

Republicans

John W. Wydler, New York
Barry M. Goldwater, Jr., California
John B. Conlan, Arizona

The broadened jurisdiction of the new subcommittee was defined as follows in 1975:

Legislation and other matters relating to civil aviation research and development (includes NASA and Federal Aviation Administration aviation research and development programs), surface transportation research and development oversight (includes the Department of Transportation, Coast Guard, Federal Highway Administration, National Highway Traffic Safety Administration, Federal Railroad Administration, Urban Mass Transportation Administration research and development programs), and that part of the annual authorization for the National Aeronautics and Space Administration relating to aeronautical research and development.

Milford, born in Bug Tussle, Tex., was first elected in 1972 out of a newly created district containing a mixture of black liberal as well as conservative suburbs of Dallas and Fort Worth. The district, adjoining Teague's, was from the start closely marginal in Democratic primaries, and Milford was defeated in the 1978 primary attempting to be nominated for his fourth term. It was at the beginning of his second term that he vaulted into a subcommittee chairmanship



Representative Dale Milford (Democrat of Texas), center, with Subcommittee Staff Director Ralph N. Read, right, and William Brooks of NASA's Langley Research Center.

In a self-portrait delivered before a congressional committee, Milford once stated:

Unlike the vast majority of Members serving in this body, I have never held a political office of any kind prior to being elected to Congress in 1972. My profession consisted of working in two closely related fields, aviation and meteorology. Prior to coming to Congress, I was a nationally recognized consultant in those fields with an established expertise in air safety. I have personally logged over 6,500 flying hours in every type of aircraft from a small two-seater, that I built myself, to DC-10's and helicopters. Therefore, aviation to me is more than just a committee jurisdictional matter. I have spent my entire life working in this field. My first job in 1942 was employment as an aircraft communicator in the old CAA—that is now the FAA. I later became an aircraft controller during World War II and a pilot beginning with the Korean war

Milford had also been a television weathercaster prior to his election. Heavy set and bespectacled, he maintained a good standard of sartorial excellence. Once he had made up his mind on an issue, colleagues found him difficult to "reason" with. He generally played his legislative cards close to his chest, phlegmatically.

For most of the period, Milford's staff director was Ralph N. Read, whose credentials in the aeronautics field were impressive. A graduate of Georgia Tech in aeronautical engineering, Read had been a pilot in the old Army Air Corps, and also saw pilot service in the wartime

Air Force and for United Airlines. He had also directed flight training, engineering and flight operations for United Airlines, following which he served in a number of supervisory and regulatory positions in the Department of Transportation and Federal Aviation Administration.

ORGANIZING THE SUBCOMMITTEE

The Milford subcommittee had little time to get organized and briefed before plunging into the NASA authorization hearings early in February 1975. In opening the hearings, Milford noted:

The formation of our subcommittee reflects a basic fact: during recent years our predecessor subcommittee—Aeronautics and Space Technology—had increasingly devoted more time and attention to aeronautical R. & D. Strong efforts were made to bring about more emphasis by NASA on major problems in aviation.

The reorganization of the House adopted last October clearly expressed Congressional intent that all civil aviation R. & D. should receive greater visibility, more attention and emphasis.

Milford stressed that the results of NASA aeronautical R. & D. would flow first and foremost to U.S. industry before being made available internationally.

Wydler for his part stated that one of the objectives was to "keep up the momentum in our program." He added:

We have striven mightily, as your statement points out, to keep some emphasis and attention on the problems of aeronautics in our country, and I think we have had a measure of success in that regard. In my humble judgment, the subcommittee has been the catalyst of great Federal efforts in aeronautics and it has been all to the good of our Nation.

Wydler observed that the aeronautics program was probably the portion of the NASA effort "which the public in general can understand the best and appreciate the most."

In addition to its first hearings, the Milford subcommittee scheduled joint field trips with the Space Science and Applications Subcommittee to Lewis and Langley Research Centers.

Interestingly enough, the Milford subcommittee in making its first recommendation on the NASA aeronautics authorization in 1975 added \$44.5 million to the budget for construction, with no add-ons for R. & D. The subcommittee argued convincingly that space had hogged most of the construction funds down through the years, and as a result aeronautical facilities were becoming both obsolete and obsolescent. In the full committee markup, Winn expressed reservations about the \$44.5 million increase above the budget, noting:

I am just afraid that some of us who have gone on the floor in the last two or three years to defend the Science and Technology full committee recommendations may have a little trouble with the way we are increasing through the various subcommittees.

Milford responded that the amendments were "ones that will fly" and Winn did not press his opposition any farther. The two items on the east and west coasts involved starting a trans-sonic research tunnel at Langley and modifying the subsonic wind tunnel at Ames. Although the two items survived the House, the Langley item was knocked out in conference, and the Ames project survived.

Milford submitted a useful table in his report to the full committee, tracing the history of aeronautics funding from the beginning of NASA. The revealing statistics showed that an average of only 4.7 percent of the grand total of NASA budgets had been spent on aeronautical R. & D. Milford also criticized the fact that aeronautical R. & D. had not been accorded "sufficiently high priority," and that facilities for this purpose had basically been built in the 1940's. In the absence of Teague, Hechler was presiding, and Wydler commented:

I subscribe to the committee view, Mr. Chairman. I think in fairness to the former committee chairman of the Aviation Subcommittee, and meaning yourself, and the emphasis you put on getting NASA to pay proper attention to the aeronautics part of the budget, it should be pointed out that although these overall figures are as stated, the fact of the matter is that from 1963, when I first came to this committee—and I think about that time Mr. Hechler became the chairman of the subcommittee—only about 1.3 percent of the NASA budget was being applied to aeronautical R. & D. We have reached the point now where it is 9.6 percent in the current fiscal year.

DEVELOPING FUTURE PLANS

On May 6, 1975, the subcommittee assembled to discuss future plans for the calendar year, including the following:

Overview hearings of the Department of Transportation R. & D., to determine objectives, allocations and problems.

Oversight extending through a 20-month future period to determine the interrelationships between NASA, FAA, Department of Defense and industry in conducting aeronautical R. & D., and whether overall objectives are being pursued effectively.

Oversight on aircraft noise R. & D.

Review and outlook for aeronautics to the year 2000.

Aviation safety.

Milford indicated that the concentration in 1975 would be on the major oversight review of all Government-sponsored aeronautical R. & D. He reached an agreement with the House Public Works Committee, of which he was a member, that the R. & D. portion of the Airport and Airway Development Act of 1975 would be reviewed by the subcommittee. Milford seemed unsure of his ground, although the 1974 reforms were very explicit. He told his subcommittee:

It was one of those shady areas jurisdictionally that we were not sure of, as there are some others under this new reorganization plan. The negotiation with Public Works resulted in agreeing that this was under our jurisdiction.

Milford also mentioned that he had contacted the chairman of the Armed Services Committee, preliminary to exploring whether there was any duplication with the military on aeronautical facilities and what could be done toward sharing wind tunnels and other facilities.

On the issue of staff, Milford told his subcommittee:

I have discussed with Chairman Teague, and he is in agreement, that a good requirement for this particular subcommittee would be a relatively small staff, legislative professionals, and the use of consultants in these particular areas that we start getting into, that we call in a man from industry, or some other source, for three months or six months, and then send him back to his job.

Milford also observed that he hoped some sense could be brought into an overall national transportation policy:

You've got one mob that runs the roads, and another one the airways, and another one the airplanes, and they're each out for their own round, without stopping to tie all of them together into a national transportation system. Hopefully, we might be able to do that in the realm of R. & D. which would lead, then, to the development of a national transportation policy.

May was a busy month for the subcommittee. Not only were hearings held on the R. & D. portion of the Airport and Airway Development Act, but also testimony was received from all constituent agencies of the Department of Transportation. This was termed an "overview" rather than oversight as it amounted to a briefing, which was preceded by staff visits to those agencies. Lloyd presided over one day of the overview hearings as Milford was on the Senate side of the Capitol. This gave Scheuer an opportunity to chair the hearings when Lloyd was called to the floor for consideration of an armed services bill.

R. & D. FOR THE FAA

On June 11, the Milford subcommittee met to mark up title II of the Airport and Airway Development Act (ADAP). Title II recommended annual instead of the customary 5-year authorizations for FAA R. & D., and also made several increases in the FAA R. & D. The subcommittee discussed the future, and the healthy aspects of requiring annual oversight. Lloyd remarked:

It is going to be a shocker to them. What a change, and I do have a couple of items I would like to ask them about.

Because of the deadline pressures, the subcommittee had to act with unusual speed, causing Wylder to say at one point: "I am a little nervous with the figures we are throwing in." Goldwater also expressed the need for a more thorough review of FAA R. & D., and confessed that "in the short period of time that we have to look at it, we have not given it a thorough going over, and had an opportunity

to ask sufficient questions." The time pressure was so great that Milford had to assemble his subcommittee in the Rayburn Room off the House floor for the final vote on the June 11 markup. It was then presented to the full committee on June 17, and accepted.

SENATE REBUFFS ANNUAL AUTHORIZATION FOR FAA

Although the Public Works Committee had agreed to, and did accept title II as presented by Milford's subcommittee, and the House endorsed the changes, there was still a rocky road ahead. In October, Teague asked Speaker Albert to appoint Milford as a conferee on the ADAP bill, because of his unique position on both the Science and Public Works Committees and the effort he had put forth in incorporating title II into the bill. But no conference actually took place. The negotiations went on for several months, then ended fruitlessly when the Senate declined to go along with the concept that there should be annual authorizations for FAA R. & D.

Failing in this venture, the subcommittee turned its attention toward the appropriations, rather than the authorization. Unfortunately, the House Appropriations Committee slashed the FAA R. & D. appropriation by slightly over \$20 million. Milford prepared a floor amendment to restore the cut, but compromised on making his case in a colloquy which established the need for the R. & D. funds.

The subcommittee next focused on aircraft noise abatement. Wydler had a strong interest in this area, and Milford made sure he didn't carry his interest too far. On the eve of new hearings which got underway at the end of September 1975, Milford persuaded Teague to send him a brief memorandum reminding him of the committee jurisdiction:

Your Subcommittee on Aviation and Transportation R&D is involved in some very important and interesting areas of responsibility.

However, because some of these areas have attracted much public attention, the role of the subcommittee should be clearly defined.

Therefore, I would urge you to remind the Members of the subcommittee that the subcommittee's jurisdiction relates to R&D and that regulatory matters are not within the scope of this jurisdiction.

I wish you and your subcommittee success in all your future endeavors.

A WORD OF CAUTION ON JURISDICTION

The memorandum was useful for Milford to stress that he did not want any eager beavers on his subcommittee to get out of line and start insisting that more be done on issuing noise abatement regulations. This is why, when opening field hearings on September 29 at the John F. Kennedy International Airport, Milford warned:

As a word of caution, I cannot overemphasize the fact that this hearing and in fact this subcommittee's jurisdiction is concerned only with the matters pertaining to research and development. Regulatory matters are not within the scope of this jurisdiction. Chairman Teague has provided me with a memorandum to that effect.

Wydler, in his opening statement, indicated that jet noise "severely and directly affects the economy of the airlines" by limiting the sites available for airports. He also pointed to the lack of coordination between R. & D. and action agencies like FAA and EPA, and the necessity for getting them to work together. The hearings shifted to Washington for two more days. The report the subcommittee issued once again expressed concern that faster action was not being taken by Government and industry to reduce aircraft noise. The Secretary of Transportation was urged to give "early, full and thorough consideration" of the sound absorption material (SAM) retrofit option with particular attention to the economic cost-benefit aspects. The committee concluded that:

Noise reduction technology has been convincingly demonstrated and it is time to facilitate its implementation.

The subcommittee's experience with meeting crash deadlines early in 1975 on the NASA and FAA R. & D. requirements spurred the decision to hold several field briefings in October, followed by prebudget authorization hearings in November 1975. Read, in a September 3 memorandum to Milford, pointed out the problem with the schedule used early in 1975:

The difficulty with this approach was that it placed a tremendous burden on the subcommittee and staff to complete its review prior to the deadline. While obviously possible, this tight schedule did not permit as thorough a review as might be desired.

FIELD TRIPS

On October 15 and 16, the subcommittee visited Flight Research Center, and also Ames, Lewis, and Langley Research Centers, followed by visits to the National Aviation Facility Experimental Center in Atlantic City, N.J. and the Transportation Systems Center in Cambridge, Mass. Washington hearings were then held in November. The subcommittee also covered the FAA R. & D. area in a preliminary hearing in November. This made it easier to concentrate on the specific dollar amounts and new starts when the February budget hearings were scheduled.

Increasingly, as 1975 progressed, Lloyd took a more active part in the hearings and presided over several sessions. For example, in opening the NASA authorization hearings on November 4, 1975 Lloyd stated:

I might note before beginning this morning that I am very interested in keeping this country at the forefront of the world's aviation industry. One of the most im-

portant factors in achieving that goal is maintaining a viable, dynamic aeronautical R. & D. effort. Ever since I have been in Congress, I have maintained that NASA should vigorously strive to meet this challenge, and not place aeronautical R. & D. on the back burner.

GROUND PROPULSION R. & D.

There were only minor changes in the aeronautical R. & D. section of the NASA authorization bill which the subcommittee brought out in 1976. One very promising provision which had been inserted by the full committee to authorize NASA to utilize its scientific and engineering competence in emphasizing ground propulsion R. & D. was unfortunately knocked out in the conference committee.

Back in the 1960's and early 1970's, when the subcommittee lacked the jurisdiction to exercise oversight in this area, it was understandable that priority concentration was in the area of aeronautics. Some subcommittee members, however, were restless at the failure of the subcommittee to do more aggressive work on ground propulsion systems once the jurisdiction was expanded in the congressional reforms which took effect in 1975. Milford's background and interest were clearly confined to aeronautics, and most of his time and effort was devoted to this area with which he felt secure. Aside from "overview" briefings in 1975, and a "simulated authorization" series of hearings concerning DOT ground transportation R. & D. during July and August 1976, the subcommittee was not active in this area. The exciting probe which Symington's Space Science and Applications Subcommittee had conducted in 1974 which lifted the curtain on alternatives to the internal combustion engine for automobiles failed to get any followup from the Milford subcommittee. Concurrently, the aggressive interest of McCormack in the possibilities of electric vehicles caused him to seize the ball. McCormack's subcommittee linked the whole issue to energy, and won a jurisdictional battle without firing a shot.

DISSENSION REARS ITS UGLY HEAD

During 1976, the first signs of dissension within the subcommittee appeared. The attendance at meetings began to fall off. Milford wrote memos to both Teague and the members, complaining that there was very little enthusiasm for productive hearings if only one or two members attended. Several members, notably Goldwater, indicated that they were never informed or consulted concerning future committee plans until the last minute, at which time they were simply notified: "This is it", without a chance to have meaningful advance discussion of decisions. Milford asked Teague whether

it would be possible to reduce the number of subcommittees so members could devote more time to his subcommittee or else appoint a study group to review the problem. Teague informed Milford that this was not an unusual situation, and Milford would just have to live with it:

Dale, every Member of Congress has the problem you write about and we have had that problem ever since I have been in Congress. * * *

I do not intend to appoint a study group as you suggest. It is just more work for other people and for me. If you think you have problems, wear my shoes for a while.

A bitter fight erupted over the hiring of Lloyd Hinton, recommended by Wydler as a minority staff member. Hinton had also been active and was knowledgeable in the area of aircraft noise, which Milford used as an argument against hiring him. He informed Wydler he would approve a salary of nothing higher than \$15,000 a year. Wydler obtained an opinion from Representative Frank Thompson, Jr. (Democrat of New Jersey), chairman of the Subcommittee on Accounts, that for Milford to dictate Hinton's salary would constitute a veto power over an appointment which was Wydler's right under the rules. Swigert backed up Milford and strongly resisted Hinton's employment, while Scheuer and Ottinger, Democratic members of Milford's subcommittee, each took up for Hinton. Wydler finally won the battle and Hinton was placed on the payroll, but the imbroglio did not endear Milford to other subcommittee members. As we shall see, Milford always cast a suspicious eye at Hinton whatever he did.

FUTURE OF AVIATION

During May 1976, Milford arranged hearings on the "Future of Aviation," the purpose of which was to lay the basis for "the formulation of a national civil aviation R. & D. policy." In announcing the hearings, Milford stated:

Aviation in this country is in serious straits. It is time that the government not only recognize this but take positive steps to rectify the situation. It's time that this government ended its policy, or rather no-policy, of stop-and-go short-sighted and disjointed R. & D. programs. We must instead embark on a stabilized approach that will allow industry to lay long-term investments.

The hearings attracted a sizable group of experts in aviation, including top Federal officials like DOT Secretary William T. Coleman, Jr., FAA Administrator John McLucas, NASA Administrator Fletcher, EPA Administrator Train, president of Eastern Airlines Frank Borman and a string of other notables from private industry. On September 17, at a news conference held at the Dallas-Fort Worth Airport, Milford, joined by Teague, unveiled the subcommittee report on "The Future of Aviation." Included were a number of recommendations designed

to maintain U.S. preeminence in aeronautics, including Federal subsidies "to ease the legitimate problems of capital formation that are now forcing U.S. manufacturers to go overseas in joint ventures." The report advocated that "it is clearly in the national interest for the United States to build an environmentally acceptable, fuel efficient and economically viable supersonic air transport aircraft." In accompanying views, Goldwater suggested "phased but steady deregulation of the airline industry," defining and strengthening the role of NASA in aviation R. & D., and modification of depreciation and antitrust requirements to aid the aviation industry.

Milford's subcommittee ended its first two years of activity with another round of field trips to aeronautics installations and another pair of advance authorization hearings on NASA and FAA R. & D. Despite repeated efforts, the subcommittee could never get the Senate to go along with their concept of annual authorization legislation for FAA. The hearings amounted, therefore, to recommendations which did not have the force and effect of law.

The issue of the SST came to a head in 1976 when the French and British Concorde were making test flights out of Dulles Airport. Wydler decided that it was about time to find out for himself just how noisy the Concorde actually was in EPNdB's (effective perceived noise decibels). Armed with a special noise meter, Wydler and several others piled into the car and headed for Dulles Airport. On the way out, they hit a bump which tore the muffler, resulting in a roar which reverberated through the Virginia countryside for the rest of the distance. The noise meter shot up to a level higher than the noise produced by any American jetliner. Then when the Wydler entourage reached Dulles, they found that the pilot had arbitrarily changed the runway he was to use. So when the Concorde took off some distance away it was "quiet as a pussycat" and registered far less on the noise meter than the roar caused by their own automobile.

A NEW NAME FOR THE SUBCOMMITTEE

As the 95th Congress opened in 1977, the Milford subcommittee was renamed "Transportation, Aviation and Weather." Milford at the first committee Democratic caucus meeting on January 25, 1977, argued for calling it "Aviation and Weather." But the next day he explained:

Mr. Chairman, yesterday I spoke rather hastily and after consultation with some of the members of the staff, they have indicated they didn't like my brilliant idea of the name change. So I would ask unanimous consent to change the name of

the Aviation and Weather Committee to Transportation, Aviation and Weather in order to more fully identify its jurisdiction.

There being no objection, the new name was officially established on January 26.

As the Democratic members bid for places on the various subcommittees, it soon became evident that the Milford subcommittee was not very high on the popularity list. Nobody expected it to challenge either of the energy subcommittees in attractiveness, but the discussion in the Democratic caucus soon revealed an almost embarrassing lack of enthusiasm for this subcommittee assignment. Milford and Lloyd, both pilots, were eager to retain their membership, but Ottinger, Scheuer and Harkin made no secret of their desire to get off, and they did not bid to be reassigned in 1977. (Harkin sat out for one term off the subcommittee and returned to take over the chairmanship in the 96th Congress in 1979.)

Roe, who held a subcommittee chairmanship on the Public Works Committee, rejoined the Milford subcommittee after running up a moderate attendance record during the 94th Congress. His interests were more actively concentrated on the activities of the Public Works Committee.

After the roll had been called for several rounds, the more popular subcommittees filled up, and there were still only four Democrats who had opted for the Milford subcommittee—Milford, Lloyd, Roe, and Glickman (a freshman). Ambro then raised this question:

Mr. Chairman, does passing mean passing in perpetuity? Or do you need warm bodies on those other subcommittees? * * * I would like to pass with just two subcommittees, if that's possible.

Finally, Ambro made the decision to choose a third subcommittee, the Milford subcommittee. Another freshman, Tonry—who was to remain in the Congress only a few months before his resignation—made up the sixth Democrat. Fuqua, temporarily presiding in the absence of Teague, then said: "We need one more on Aviation. Does anybody want to go on Aviation and Weather? We need one more."

There was further discussion, and Fuqua then added: "We are all right except for DISPAC and Aviation." Milford spoke up: "If you can't find a member for DISPAC, I will take it." Finally, Fuqua said with a tone of resignation:

I will go on Aviation and Weather if no one else wants to go on.

MEMBERS DURING 95TH CONGRESS

In this way, the Transportation, Aviation and Weather Subcommittee wound up with 10 members—the same size as the preceding Congress. The following Members served during the 95th Congress:

Democrats

Dale Milford, Texas, *Chairman*
Jim Lloyd, California
Robert A. Roe, New Jersey
Dan Glickman, Kansas
Jerome A. Ambro, New York
Richard A. Tonry, Louisiana ¹
Don Fuqua, Florida

Republicans

John W. Wydler, New York
Eldon Rudd, Arizona
Barry M. Goldwater, Jr., California

¹ Replaced in 1977 by Robert A. Young, Missouri

The jurisdiction of the newly named subcommittee was slightly expanded by definition of the Science Committee internally. "Operational weather programs of the National Oceanic and Atmospheric Administration" were formally added by the committee rules. Milford's long-time interest in weather prompted both the expanded jurisdiction and the name change. However, Brown's Subcommittee on Environment and the Atmosphere continued to retain jurisdiction over the National Weather Service and the R. & D. activities of the National Oceanic and Atmospheric Administration.

The subcommittee plunged quickly into meeting the demands of the new congressional session with an organization meeting on February 2. Once again, the immediate deadlines of the NASA and FAA authorization bills stared everybody in the face. While the reviews undertaken in 1976 were extremely helpful to the veteran members and staff, less than half of the 1977 subcommittee members had active experience with the background. To use an old and trite expression, you could name them on the fingers of one hand—Milford, Lloyd, Wydler, and Goldwater. Thus there was a problem of orientation, not to mention the challenge of other new issues which required investigation and oversight.

Although automotive R. & D. was listed as one of the subjects for possible concentration in 1977, and a staff visit was made to observe the latest developments in electric cars, activity in this area was again confined to a general review and "simulated authorization" hearing on DOT R. & D. programs. The subcommittee benefited from a report made under the leadership of Dr. Dugan, of the Special Studies, Investigations and Oversight Subcommittee, on the relation of NASA's civil aeronautical research and technology to military programs. The study pointed to mutual benefits which might be derived from interagency agreements.

The subcommittee was pleased to see construction finally proceed in 1977 on the trans-sonic wind tunnel facility at Langley, as well as the modification of the 40- by 80-foot subsonic wind tunnel at Ames, projects strongly supported by the subcommittee.

SUPERSONIC TECHNOLOGY

Although happy with an increase of over 11 percent requested in NASA's budget in 1977 for aeronautics, Milford labeled it still "a kind of drop in the bucket" compared to what the Nation should be investing in aeronautical research. He also called attention to the subcommittee report on "The Future of Aviation", noting that with three nations flying supersonic transports in commercial service the subcommittee "was somewhat shocked to find that we did not even have one on the drawing board." Milford stated to NASA that he was still wondering "whether you really read our subcommittee report." A NASA witness subsequently answered:

In preparing NASA's proposed fiscal 1978 aeronautics program, we have had the benefit of the October, 1976 report of this subcommittee on its review of the future of aviation. I think it is safe to predict that aviation will be materially improved by that report.

The subcommittee put in a new line-item for "agricultural aircraft systems technology", a special interest of Goldwater, along with a \$2.5 million increased authorization in that category. This item plus a \$3 million increase in what was termed "the extremely promising materials work in superplastic forming and diffusion bonding" both passed the House. But the conference committee eliminated the line item and settled on an across-the-board \$3 million increase.

The subcommittee also tackled the FAA R. & D. authorization in February 1977. Milford seemed more kindly disposed toward FAA than NASA, saying they had been criticized, "but we often tend to overlook the fine accomplishments of this agency" which he noted had helped the U.S. airlines "achieve in 1976 their best safety record in 50 years." When Rudd asked a few questions about total personnel, Milford interjected:

My experience has always been, in dealing with the agency, that whatever detail you would like to delve into, I believe you could simply notify them by telephone at the time and they will come forward with whatever information you want for your own personal satisfaction.

In its hearings, the subcommittee shared with the Interstate and Foreign Commerce Committee a negative feeling toward Aerosat, an air traffic control satellite planned by Canada, the European Space Agency and the United States. Noting that Aerosat would eat up

one-third of FAA's R. & D. budget for the next 6 years, the subcommittee concluded that "there is absolutely no way that the FAA can meet this funding schedule and still fulfill its designated responsibilities in critical areas of aviation R. & D." The subcommittee recommended against authorizing Aerosat except for study purposes.

Once again in 1977, although the subcommittee received votes of confidence from the full committee and the House, the Senate declined to go along with the subcommittee's concept of an annual authorization for FAA's R. & D.

AIRCRAFT SALES TO FOREIGN COUNTRIES

During the year, Milford became increasingly disturbed with the attitude of the Carter administration toward the sale of aircraft and aerospace products abroad. He pointed out, in a February 14, 1977 letter to President Carter:

Many of my aviation-oriented colleagues in Congress, as well as the entire aerospace industry, have become alarmed by recent press accounts of alleged new policies concerning the curtailment of foreign military aircraft sales by your administration. To limit military aircraft sales to various parts of the world, without careful study of all the impacts to the U.S., while having no mechanism to prevent our foreign competitors from making these same sales, would be devastating. * * * While *civil* aviation is the primary concern of this subcommittee, our civil aircraft sales are now and will be inseparably linked with foreign military aviation sales.

One of Milford's subcommittee staff consultants, famed X-15 pilot A. Scott Crossfield, also felt strongly on the issue and wrote retired Air Force General Bernard H. Schriever on July 8 that "aerospace export has virtually ground to a halt." Crossfield blamed the 1976 arms control act "compounded by the President's human rights declarations, exaggerated by the eager liberals on the White House staff, further exaggerated by State's desire to respond to the President's declared policy. * * *

THE HEATED MLS CONTROVERSY

Increasingly as 1977 progressed, a split developed within the subcommittee. The issue of the microwave landing system (MLS) and the extent of implementation of that new system by the FAA sparked one of the most heated controversies the Milford subcommittee experienced. The argument involved the so-called "doppler system" once investigated but rejected by the FAA and subsequently pushed by the United Kingdom, as against the so-called "Time Reference Scanning Beam" (TRSB) favored by the FAA. By a closely-divided vote, the International Civil Aviation Organization supported the system favored by the United States. Following lightly-attended hearings in February, Milford inserted language into his subcommittee

report favoring the American-FAA-ICAO decision. He also wrote strongly worded letters to DOT Secretary Brock Adams and FAA Administrator Langhorne Bond in June and July, expressing the determination (on committee stationery) that the FAA must "take positive action" to declare the TRSB a national standard. Milford sprinkled his letters with phrases like "absolutely imperative"; and "not only can this be done, but it must be done." He warned that the Defense Department was hanging on the results of the FAA decision.

The letters closely followed the general line of thinking in the FAA. A majority of the subcommittee, with no foreknowledge of Milford's action, became incensed to discover they had not been consulted or even sent copies of these strong policy letters. Wydler launched a powerful counter-attack when news of what Milford had done leaked back. Wydler initiated an August 4 letter, signed by 9 Members (8 on the subcommittee) urging DOT Secretary Adams to conduct field tests of both the doppler and the TRSB systems on a fair and open basis. Wydler's letter stated:

Our main interest is to see that the United States and the rest of the world obtain the very best precision approach system. It is likely both systems under consideration are good ones and the question is which has the advantage, if either. In seeking the truth, we should be most careful to make sure that our international relationships are not damaged and that all the proceedings are conducted in a totally open and honest manner.

The lobbying rose to a new crescendo, with charges and counter-charges being thrown around on both sides. While Milford and the FAA were attacking the United Kingdom, alleging fraudulent claims and excessive pressure tactics on behalf of the doppler system, the other camp was contending that the FAA had won a narrowly favorable decision from the ICAO through equally reprehensible tactics. Milford telephoned Fuqua and persuaded him to write Secretary Adams and dissociate his name from the Wydler round-robin letter, which Fuqua did on August 16. But that still left 4 Democrats and 4 Republicans whose signatures were on the August 4 letter.

In September 1977, during the fall hearings on FAA R. & D., the issue bubbled to the surface again. One salutary result was that attendance at the subcommittee, which had been lagging, suddenly zoomed upward. Not only did subcommittee members show up in force, but Milford welcomed Harkin, an accomplished pilot and member of the full committee, who asked to take part in the questioning because he had taken an interest in the MLS systems. Harkin declared:

I guess I am not interested so much in picking the American system or picking the British system. What I am interested in picking is the safest system, the best system, compatible with cost.

Lloyd, also a pilot, said that his background indicated to him "that there really is not two cents worth of difference between the two systems." He added that what "sticks in our craw is a clear indication * * * that there has been some perceived lacking of fairness in this whole thing." Milford declared that there were "selfish interests involved in either seeing the decision delayed or even not made." He added that the engineers had made the proper tests, but the "lobbyists and politicians" were now complaining. Milford stated:

I have also observed some less than commendable lobbying activities.

Milford said that further delay was against American interests, that urgent action was needed by the Army, by large and community airports, and by offshore oil producers. Therefore he concluded:

It is time to cease the bickering, and the backbiting and to proceed resolutely forward with a common goal that of developing and installing an improved instrument landing system one that may save thousands of lives here, in the United Kingdom and indeed the entire world.

Wydler responded dryly that "my own experience in this particular matter is there are lobbyists and politicians on both sides of the issue." He then remarked:

What I am hoping we will do is go forward in a spirit that will allow us to conclude this matter with a good taste in everybody's mouth. And I think that is the important thing to do. And satisfy the politicians and lobbyists on both sides.

THE CONTROVERSY DIVERTS THE SUBCOMMITTEE

The divisive battle over an appropriate MLS system sapped the energies of the subcommittee and staff during much of 1977.

Milford enlisted Teague in his efforts, and Teague on numerous occasions backed up his subcommittee chairman, perhaps more than usual because Milford was the Congressman from the adjoining district. But he would not countenance one of Milford's requests. On several occasions, Milford asked Teague to fire Lloyd Hinton of the minority staff, for various activities, including his assistance to Wydler during the bitter MLS controversy. Each time, Teague would summon Hinton to explain his activities or furnish a memorandum in response to allegations. Since Milford had opposed Hinton's appointment in the first place, he was eager to have him purged. Teague listened to both sides of the bitter personal controversy and Hinton remained with the committee for several months after the expiration of Milford's term of office on January 3, 1979.

A NEW OUTBREAK OF CHARGES AND COUNTERCHARGES

On November 29, 1977, Milford was asked to testify before the House Government Operations Subcommittee on Government Activi-

ties, which was at the time holding hearings on FAA safety and procurement management. Milford brought up the subject of MLS out of the blue:

One cannot charge the Federal Aviation Administration with malfeasance or laxity without also charging the authorizing subcommittees with failing to do their work. * * * Mr. Chairman, I must personally take exception to some of the vicious attacks that are unjustly directed toward the FAA. These unjust attacks imply that the committees on which I sit are not doing their jobs. In a sense it is a slander of the dedicated and hardworking members of these two committees and I frankly resent it * * *. A strong lobbying campaign which unjustly and maliciously attacked the FAA program and the decision of the ICAO panel (on MLS) has found its way into the offices of some congressional Members. This campaign has been very successful with those who are unfamiliar with the facts.

Milford then referred to a recent television program, and commented:

The allegation that FAA cheated in its handling of the MLS program is totally without foundation. My subcommittee has thoroughly investigated this charge and it simply is not true.

The atmosphere became a little tense when the subcommittee chairman, Representative John L. Burton (Democrat of California), observed:

We are out to find out what the facts are and if we really wanted to have a television spectacular, that would be for someone else to sponsor * * *. I am a little bit surprised by your attitude toward this committee: That we would dare to have a hearing on the FAA.

The following January, Burton announced his subcommittee would hold three days of hearings on FAA procurement of MLS. Teague warned the chairman of the House Government Operations Committee, Representative Jack Brooks (Democrat of Texas), of the consequence of these hearings. In a memorandum which parroted what Milford had been saying, Teague informed Brooks:

I am very concerned that the timing of your subcommittee's hearings, coming so close to the ICAO vote, could be very detrimental to the efforts of the ICAO. * * * Unfortunately there are those who have a vested interest in delaying the ICAO vote and have mounted an intensive lobbying campaign in Washington in order to effect such a delay. This has been an irresponsible and unscrupulous campaign in order to protect a selfish interest in the ICAO selection.

Because of the great technical detail associated with the MLS program, this lobbyist activity met with some success in Congress by presenting one side of the issue. Continual and thorough examination of both sides of the MLS issues by my subcommittee and staff has revealed the weakness of this lobbying effort and enabled the subcommittee to continue its support of the program.

Mr. Chairman, I want to caution you to be particularly aware of this lobbying activity. They have lost the technical battle so far in ICAO and realize that their last chance to upset the applecart is in the political arena.

Brooks and Burton both received pressure from many sources—congressional, FAA, and State Department—to cancel the hearings. When Burton opened the hearings on January 31, Brooks was at his

side to announce his "full support" and commendation for holding the hearings. Brooks added:

We have had a lot of dealings with the FAA. Their track record has not been what I would call beautiful.* * * I find it very astounding that the Administrator of the FAA has tried to get this subcommittee to cancel the hearings.

THE BURTON-GOLDWATER AXIS

The leadoff witness was Goldwater, followed by Harkin and Wydler. Goldwater started off by observing that "anytime John Burton and Barry Goldwater can agree on anything, then it must be one helluva problem." He then scored the Milford subcommittee:

I am not convinced in my own mind that our subcommittee has conducted a thorough investigation of this controversy. If it had, these hearings would not be necessary. In addition, during the course of hearings and questioning of witnesses, especially the FAA, adequate and sufficient answers have not been forthcoming from the FAA. Or, if they had, I would not be sitting here.

Goldwater reiterated that he had no idea which MLS system was superior, and "I really do not care which system is chosen." He concluded:

We have a mess on our hands—and I hope the news media is listening to this—because we in the Congress have failed to provide effective oversight. We pass money bills around this place and give agencies of Government untold powers and then conveniently forget about the whole darned process. No wonder public opinion polls show Congress at a low level in terms of prestige and respect.

Walker, a member of both the Science Committee and the Burton subcommittee, raised the same issue as Goldwater had raised; namely, that "one of the reasons why this problem has arisen is because there has not been proper oversight by the subcommittee responsible in Science and Technology." Wydler responded:

I think in this particular case there has been a sharp division between the attitude of the chairman of the subcommittee and the majority of the members on the subcommittee—be they Democrats or Republicans.* * * I think the fact these hearings are being held speaks for itself—that it was necessary to go beyond where we had gone and to dwell on things that we had not dwelled upon.

When Harkin testified, he added:

To the suggestion that these hearings should not be held now, I say they would not have had to be held now had FAA come forward and responded to requests made by Mr. Goldwater, Mr. Wydler and myself over the past months to open up the process to scrutiny and respond to questions I submitted last October.

The Burton subcommittee hearings were scarcely over before the Milford subcommittee went into another round of divisive argument over MLS. Looking back on the experience in the Burton hearings, Wydler and Milford had this exchange:

Mr. WYDLER. We were embarrassed by the last hearings and this will be even worse.

Mr. MILFORD. I do not know that we were embarrassed. I think there were some unfortunate statements made that had no substance.

Mr. WYDLER. I cannot agree with you. I am not saying, you know, that I agree with all the things said at the hearings but I say I was embarrassed as a member of this committee to see them duplicating our work.

WHO IS THE "CLOWN"?

At the full committee markup session on March 7, 1978, Lloyd's amendment unanimously passed, requiring quarterly reports from the FAA on the MLS status and their negotiations. The scars of conflict had not healed. Members of the subcommittee broke out into a new argument over the entire MLS controversy, Wydler termed the lack of information from the FAA "disgraceful," and Harkin and Wydler both argued that the committee should declassify the minutes of a subcommittee executive session in which the FAA had agreed to meet with the members off the record. They both made the point that there was nothing of a security nature included in the executive session minutes, and Wydler protested a procedure whereby a "Federal agency can sort of wrap a cloak around all of the material that is placed before the committee." In rebuttal, Milford scarcely endeared himself to his subcommittee members with this offhand comment:

It was simply an attempt to allow that international body (ICAO) to go and do its work without some clown being able to stand up and say "a committee in Congress" —

Expressing some frustration, Harkin summarized the controversy in these terms:

What's involved are the egos of a bunch of engineers at FAA here and a bunch of egos of engineers over there, the only thing that's involved in this whole process.

The internal squabble finally died down as further testing caused FAA and ICAO both to hold their original positions. The net effect of the controversy was to divert the subcommittee from other pressing priorities and also cause bad feeling among the members and staff. Milford's defeat in the Texas Democratic primary in 1978 also caused the bitter feelings to simmer down.

AIR TRAFFIC CONTROL

During 1977 and 1978, the subcommittee performed constructive work in other areas of aeronautics.

With subject matter producing more controversy among the witnesses than within the subcommittee, Milford staged six days

of hearings in June and September 1977 on "Future Needs and Opportunities of the Air Traffic Control System." The 711-page record of the hearings quickly revealed the biases of the witnesses: The FAA and the air traffic controllers themselves continued to favor a ground-controlled system; pilots leaned toward more pilot participation in the process; industry supported more application of new technology; and some users feared mandatory equipment requirements. In transmitting a final report on his subcommittee's work in this area, Milford commented:

Recent advances in sophisticated computer, satellite and avionics technology offer great potential for vast improvements upon the present system. However, there seems to be a lack of a concentrated effort to thoroughly examine many of these potentials.

Milford concluded:

It may take some revolutionary thoughts in order to effect some evolutionary progress.

Milford and the subcommittee consistently supported additional efforts by NASA to achieve supersonic technology readiness. The subcommittee requested NASA to prepare a plan which would achieve this goal by the early 1980's, but the plan disappointed Milford. In an October 4 memorandum to Teague, Milford charged:

NASA took a much less aggressive approach to the plan than was originally envisioned * * *. The opponents tried to whip up the old hysteria that surrounded the demise of the American SST. On the floor, we ultimately had a landslide vote in favor of continuing NASA's small program in supersonic technology * * *. Apparently, NASA management backed away from any serious thought of advocating a stepped-up supersonic technology program. They evidently feel the risk to other programs is too great to justify an open push at this time.

At Milford's urging, Teague wrote NASA Administrator Frosch on October 13, 1977, asking NASA to redo the supersonic technology plan and program, and resubmit it by the end of 1977. Once again, it did not completely satisfy Milford's strong interest in pushing for quicker development of supersonic technology, an interest shared by a majority of the subcommittee. During Milford's final year as chairman, the House at the recommendation of the subcommittee added \$28.2 million to the NASA request of \$264.1 million for aeronautical research and technology. The Milford subcommittee earmarked \$12 million of this amount for speeding up the variable cycle engine and supersonic cruise aircraft research programs. The Senate conferees were also interested in these areas, but would settle on only a \$11 million net increase in the total NASA aeronautical authorization.

THE FIRST "A" IN NASA

Following up on the 1976 hearings on "The Future of Aviation," the Milford subcommittee in July 1978 held three days of overview hearings entitled "First 'A' in NASA." Milford chaired the hearings the first day during testimony by NASA witnesses; Lloyd the second day for the testimony of Dr. Robert Locwy, Chairman of the NASA Aeronautics Advisory Committee and George Benning of the Collins Avionics Group; while Glickman chaired the third day devoted to the testimony of F. Allen Cleveland, president of the American Institute of Aeronautics & Astronautics, and Dr. Jan Roskam of the University of Kansas Department of Aerospace Engineering and also Standly J. Green of the General Aviation Manufacturers Association. Glickman, from Wichita, told the subcommittee that "my district produces over half of all airplanes made in the world, mostly general aviation aircraft."

The subcommittee report on these major hearings once again underlined the subcommittee's continued stress on the need for expanding long-term basic research and technology in such areas as supersonic aircraft; large, all-weather vertical take-off-and-landing transports; and other fields where the FAA had traditionally been responsible, namely, aircraft operating systems and navigation.

Some more internal dissension came to the surface as the biennial congressional elections of 1978 approached. Teague and Milford both approved a Lloyd request to hold a one-day subcommittee hearing on August 25 at Pomona College in Claremont, Calif. Lloyd invited other members of the subcommittee to attend and participate in a hearing on automated weather services, navigation and final approach equipment and transponder R. & D. technology. Goldwater lodged a protest on the grounds that the hearing was simply a campaign gimmick, Milford decided the issue was too hot for him to handle, and on August 16 bucked it back to Teague.

In a letter to Milford, Teague stated:

I have your letter of August 16. The hearing in Pomona, California will not be cancelled. I approved it and it will be held. If you cannot go, or do not care to go, the next ranking member of the subcommittee will chair the hearing.

Lloyd of course was the next ranking member.

Teague then expressed his exasperation in a letter to Goldwater:

Barry, I was severely criticized by some Democratic members of the committee because I approved your trip to Hawaii. Numerous members have had hearings in their Districts and if you want one in your District, I will certainly approve it. I have just been criticized for a trip that Bob Dornan took. It hasn't been all Republican or all Democrat. Our committee needed someone who had been to Hawaii and knew

what was happening there. I was glad to approve it and I would again. Also, I think something good will come of the hearing in Jim Lloyd's district, and I will be glad to approve a hearing in your District.

If I were Jesus Christ or Solomon, someone would still raise Hell.

When the President's budget called for the closing of 19 weather stations around the country in 1978, immediate opposition arose from Members of Congress, State and local officials, and numerous private citizens. This stimulated joint hearings by the Milford and Brown subcommittees in April, following which the two subcommittee chairmen sent a joint letter to the House Appropriations Committee, strongly recommending that sufficient funds be provided for the Department of Commerce to keep the 19 stations open. This was done in the appropriations voted in 1978.

CHARTER FOR THE NATIONAL WEATHER SERVICE

A bigger issue arose on basic legislation for the National Weather Service. In 1977, Milford introduced a bill to give a charter to the National Weather Service for the first time in history. For over 100 years, bits and pieces of scattered legislation had imposed various duties on the NWS and its predecessor agencies. The objective of the legislation was to pull these all together and also for the first time give authorizing authority to the Congress for an agency which heretofore had gone directly to the Appropriations Committee. Milford also stated these reasons for introducing his bill:

The time has come to examine what the Nation wants in the way of weather services; how it wishes to organize them; and what NWS' relation should be to other Federal agencies, and to the states and local communities. It is also timely to examine what the Congress feels should be the role of the National Weather Service in research, and in the provision of specialized weather services.

Milford's subcommittee had eight days of hearings on his bill during May, June, and July 1978. Frank Hammill assisted on the bill.

Meanwhile, the Brown subcommittee was holding hearings on a much broader bill to provide an organic act for the National Oceanic and Atmospheric Administration (NOAA), of which the National Weather Service is an integral part. In consultation with the House Merchant Marine and Fisheries Committee and the Senate Commerce Committee, it was the feeling of the Brown subcommittee that this entire issue should be approached through writing the new charter for NOAA in an overall fashion, instead of simply tackling one piece of the problem through the NWS. This precipitated a clash between the two subcommittees. Brown felt that the Senate was not going to act in 1978 in any case, and it was better to reach agreement on a firmer basis for the NOAA Organic Act. Milford, who realized

after the Texas primary he wouldn't be back in Congress in 1979, pressed forward for action on NWS in 1978. Milford also expressed this reason for wanting to move ahead:

Since I was a professional meteorologist myself for many years before entering Congress, I already had a few ideas as to how the work of the National Weather Service might be improved.

Brown preferred joint consideration of the two bills, but Milford got his narrower bill reported out of his own subcommittee earlier. On August 8, the full committee met to consider the Milford bill, which had the advantage of administration support since the subcommittee had incorporated all the amendments the administration wanted. Milford stated to the full committee:

The entire NOAA should have a working over, as we have done here with simply one part of NOAA, that being the National Weather Service. This one was picked, quite frankly, for pragmatic reasons.

Brown told the full committee:

I personally took the view that it would have been better to move the broader bill. That is not possible. Mr. Milford wants to move with his bill, which is quite right and proper under the circumstances.

Brown asked that the report include language indicating the desirability of a thoroughgoing revision of the Organic Act at the following session, and these recommendations were included. Brown concluded:

With the understanding that this can be a building block in the broader program, I would certainly not want to have the committee adversely react to Mr. Milford's bill.

So the full committee on August 8 unanimously voted out the Milford bill. In Milford's absence, Fuqua took the bill to the House floor under suspension of the rules, and the House passed the bill on September 19 by voice vote. However, the Senate failed to act so the legislation went down the drain in 1978.

By the end of 1978, the Milford subcommittee had accomplished its objective of further expanding the work of NASA in aeronautical research and development. Similar efforts with FAA had some effect, although the failure of the Senate to go along with Milford's concept of annual authorizations for FAA R. & D. handicapped the subcommittee's efforts. The lack of attention to ground propulsion and automotive R. & D., along with the bitterly divisive and time-wasting controversy over MLS further limited the influence of the subcommittee. The work accomplished in the fields of air traffic control, weather and emphasis on aeronautical R. & D. were the greatest achievements of the subcommittee.



Representative Tom Harkin (Democrat of Iowa) tests out a research model automobile designed for its fuel efficiency and safety, as Representative Dan Glickman (Democrat of Kansas) looks on.

TOM HARKIN TAKES COMMAND

At the start of 1979, third-term Congressman Tom Harkin ascended to the chairmanship of the subcommittee, which was renamed "Transportation, Aviation and Communications" at the beginning of the 96th Congress. Not yet 40 years old when he became a subcommittee chairman, Harkin typified the group of young, enthusiastic

reformers swept into Congress in the wake of the Watergate scandals in 1974. After his graduation from Iowa State University, he received a law degree at Catholic University of America, and worked also on the congressional staff of Representative Neal Smith (Democrat of Iowa).

The huge 25-county Fifth Congressional District, comprising the southwest corner of Iowa, runs from close to Des Moines westward to the Missouri River and has usually supported conservative Republicans. Big, plodding, friendly Republican Congressman William Scherle, Jr. seemed to mirror the politically conservative beliefs of the district until Harkin started organizing the university students at Ames, giving Iowa a taste of a new brand of politics. Harkin set aside one day a week during which he worked at menial jobs all over the vast district, washing dishes, repairing railroad tracks, baling hay, changing diapers, and proving to the people that he understood their daily lives, their problems, hopes and dreams. This form of campaigning produced some excellent free television programs, and struck a responsive chord among the openminded voters who had elected Scherle over Harkin in 1972, but gave Harkin a 51 percent victory in 1974. By 1976, Harkin had built such a strong personal popularity that he was able to roll up 66 percent of the vote against Republican Kenneth Fulk, the well-known manager of the Iowa State Fair, thereby placing the seat in the "safe" category.

Harkin is one of the most articulate and incisive debaters in Congress, with a wide range of interests. He has served on the board of directors of the Iowa Consumers League and SANE (Citizens for a Sane Nuclear Policy). On the committee, he has fought effectively against overdependence on breeder reactors and in favor of light water nuclear reactors. He is a powerful advocate of solar and geothermal energy, conservation, and nuclear fusion development. With a broad and sensitive interest in international affairs, Harkin has also taken the lead in human rights legislation and support for struggles by all peoples to win self-determination.

At the beginning of 1979, the Harkin subcommittee included the following:

Democrats

Tom Harkin, Iowa, *Chairman*
 Jim Lloyd, California
 Doug Walgren, Pennsylvania
 Dan Glickman, Kansas
 Nicholas Mavroules, Massachusetts
 Harold L. Volkmer, Missouri

Republicans

Barry M. Goldwater, Jr., California
 Robert K. Dornan, California
 Larry Winn, Jr., Kansas¹
 Bill Royer, California¹

¹ Winn was replaced by Royer



Representative Harold L. Volkmer (Democrat of Missouri), left, and Representative Hamilton Fish, Jr. (Republican of New York).

The jurisdiction outlined for the Harkin subcommittee was as follows:

Legislation and other matters relating to civil aviation research and development (includes that part of the authorization of the National Aeronautics and Space Administration relating to aeronautics, and authorization of the Federal Aviation Administration's research and development program); legislation, including authorization, and other matters relating to transportation energy conservation programs of the Department of Energy; legislation and other matters relating to aviation-weather services; oversight of surface transportation research and development (includes Department of Transportation, Urban Mass Transportation Administration, Federal Railroad Administration, Federal Highway Administration, National Highway Traffic Safety Administration, and Coast Guard and the Maritime Administration); oversight of communications research and development (including the Federal Communications Commission).

At the committee Democratic Caucus on February 1, 1979, Harkin argued that jurisdiction over legislation relating to electric vehicles and automotive research should logically go to his subcommittee. After some discussion as to how this would affect the splitting up of the Department of Energy testimony among several subcommittees, it was finally decided that it made more sense to place both authorizing and oversight jurisdiction over ground transportation in the Harkin subcommittee. This paved the way for Harkin's subcommittee to take a far more active role in the area of ground transportation than had Milford, who had concentrated on aeronautics and aviation.

During the early months of 1979, the Harkin subcommittee faced the same time constraints as other subcommittees with authorization deadlines. This necessitated speedy action on the FAA R. & D. bill, the aeronautics portion of the NASA bill, and the transportation conservation authorization in the Department of Energy. After February hearings, Harkin assembled his subcommittee on March 2, 1979 to mark up all three items, before reporting the FAA and NASA bills to the full committee on March 14.

At the subcommittee markup session, Goldwater, a persistent advocate of fiscal responsibility, made an eloquent plea for greater emphasis on R. & D. as well as better oversight. He pointed out:

Both the NASA and FAA budgets for aeronautical R. & D. are in decline during recent years. * * * This decline comes in spite of our recognition here in the Congress that greatly expanded work in air breathing technology is urgently needed if the U.S. is to maintain its traditional world leadership in aeronautics, its most important source of foreign exchange in manufactured goods.

I would urge that we take a more critical view of the United States position in the world. I think all would agree that from most standpoints our position is deteriorating. I would suggest that a major reason for this decline is our reduced recognition and lack of effort in research and technology in many fields, especially aeronautics.

The subcommittee adopted an \$8 million increase offered by Harkin for additional experimentation on the variable cycle engine, which brought the total NASA budget for aeronautics from \$300.3 million to \$308.3 million. In presenting the bill to the House, Harkin was not optimistic:

The Committee on Science and Technology has repeatedly urged the administration and the Congress to increase the resources devoted to aeronautical R. & D. We have often pointed to the many long-term benefits of investment in this area, which are reflected in billions of dollars in sales of U.S. aircraft both here and abroad, and in millions of jobs for Americans. It is unfortunate indeed that the administration has not seen fit to put forward a single new start for the coming year.



Representative Robert K. Dornan (Republican of California), a pilot and aviation enthusiast, confers with John Allen of McDonnell Douglas Corp.

A spirited argument broke out over the amendment by Representative Ted Weiss (Democrat of New York) to strike out of the NASA bill \$22.5 million for supersonic research. Dornan mentioned that Harkin, Lloyd, and Goldwater, as well as himself, had flown supersonic. He added:

I flew the SST last year at the instigation of the distinguished prior chairman of the Committee on Science and Technology, the unique and visionary gentleman from Texas, the unforgettable Olin Teague. He said he thought it was necessary that as many Members as possible should avail themselves of the opportunity to feel the future, particularly if we would pay for it ourselves, as I did.

That supersonic flight for me in January of 1978 was an amazing experience. Mach 2 for over 3½ hours of sustained flight only 75 years after the Wright Brothers at Kitty Hawk.

Mr. Chairman, anybody voting against U.S. SST research is simply holding back the future.

The Weiss amendment was defeated, 246-137, and the House went on to pass the NASA bill containing the aeronautical R. & D. provisions.

The FAA R. & D. authorization in 1979 once again ran into a snag as the Senate declined to go along with the House in voting an annual

authorization for this purpose. As Goldwater said on the House floor on March 26, 1979:

While, unfortunately, the other body did not see fit to act on this legislation, the Committee on Appropriations has followed the recommendations of the authorization bills. In addition, the accompanying reports have had a most positive effect on the Agency itself.

AUTOMOTIVE R. & D.

Once the authorization hearings had been completed, the Harkin subcommittee began concentrating more of its work on developing alternatives to the automobiles which consumed such a high proportion of the Nation's energy. In a May 11, 1979 letter to his congressional colleagues, Harkin explained:

As many of you know, I have called for an aggressive, well-coordinated national program of automotive R. & D. To help define such a program, the subcommittee is currently holding extensive hearings on future technology options as well as possible Government roles.

In the Department of Energy authorization bill, the Harkin subcommittee added \$8 million to expand the electric vehicle program. In addition, \$12 million was added for the heat engine program, to develop and demonstrate advanced automotive propulsion systems (gas, turbine, and Stirling). The full committee approved both increases.

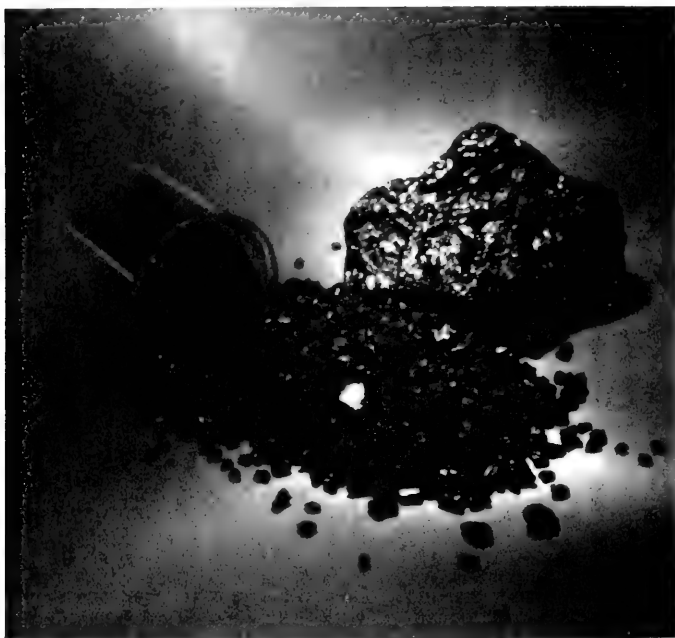
Continuing the hearings in June and July 1979, Harkin summarized his current thinking on the issue in a July 12 letter to his fellow-Members of the House:

Detroit's research facilities are stretched to the limit in trying to meet the various near-term fuel economy and pollution goals. Nevertheless, the country desperately needs new solutions, as anyone who has bought gasoline recently can plainly see.

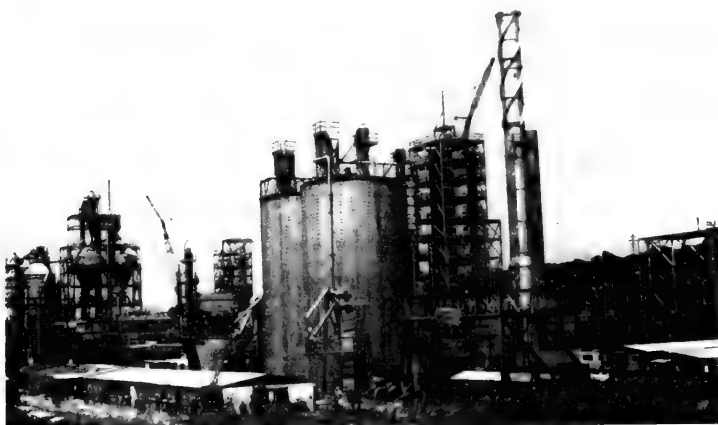
Current Government policy tries to force innovation in the auto industry through regulation. But this approach, while successful in the short run, has excluded all but the wealthiest companies, since no one else can afford the R. & D. costs. It has also resulted in very few really new ideas.

For the future, I believe the Government should emphasize "technology pull" as in the highly successful NASA/civil aircraft industry relationship. This means a federally-sponsored, industry-conducted program of automotive R. & D., the results of which would be available to all U.S. firms.

Harkin then introduced the National Automotive Research and Technology Development Act of 1979, establishing within NASA a long-term program to advance the state of automotive technology. The plan involved transferring existing automotive R. & D. programs (mainly those at DOE) during a two-year transition period. First year funding was planned to be \$25 million, to rise to \$500 million within five years.



Solid solvent refined coal (SRC), a synthetic process which the Science Committee is funding, to remove sulfur and ash before the fuel is burned.



H-coal synthetic fuel plant at Catlettsburg, Ky., authorized through the Department of Energy by Science Committee, for coal liquefaction.

No Fuel Like an Old Fossil Fuel

Coal, oil, and natural gas were the focus of the Fossil Fuels Subcommittee which was organized in 1975, and then expanded in 1977 to include nuclear. R. & D. Hechler headed the subcommittee in the 94th Congress, and Flowers in the 95th. All other energy jurisdiction fell to McCormack in both Congresses.

The Energy Research and Development Administration (ERDA), a new agency fashioned out of the former Atomic Energy Commission and bits and pieces of EPA, NSF, and the Department of the Interior, first saw the light of day on January 19, 1975—about three weeks before being summoned to present its first budget to the Science Committee on February 6. The confusion was unbelievable. Budget figures had been prepared mainly by alumni of the Atomic Energy Commission, which had been used to dealing with the tolerant and overly sympathetic Joint Committee on Atomic Energy. The AEC budget specialists had customarily used very broad general categories constituting hundreds of millions of dollars, with very loosely-reined freedom to transfer funds among big items. In 1975, the ERDA budget had a number of nuclear R. & D. items intermingled with nonnuclear, and since the committee did not inherit the Joint Committee jurisdiction until 1977, this complicated the problem further.

ASSISTANCE TO COMMITTEE BY OFFICE OF TECHNOLOGY ASSESSMENT

The Office of Technology Assessment performed yeoman service to the committee by tackling the new ERDA budget in advance of the hearings. With the aid of some high-powered consultants from the universities, OTA translated some of the key energy issues and questions presented by the budget outline. The OTA groundwork was extremely helpful. They presented their horseback judgments under great time pressure, both in briefing papers and informal question-and-answer sessions. Seated around a hollow square series of tables, working in their shirtsleeves, the OTA experts took time off from their academic pursuits long enough to give committee members and staff a personalized interpretation of the ERDA budget in brilliantly non-bureaucratic language. One Saturday and Sunday in early February,

the all-day sessions went on at Washington's social center of learning, the Cosmos Club, and continued on Monday at the Rayburn Building. OTA was not chartered for the purpose of second-guessing a new Federal agency, but their briefings were in many respects superior to ERDA's.

In addition, three full days of energy briefings were cochaired by Hechler and McCormack. They were primarily designed to acquaint new committee members with the policy issues and technologies to be considered in the ERDA hearings, but they proved useful to all who attended. The briefers included ERDA personnel, Resources for the Future, the CRS Science Policy Research Division, and FEA Administrator Frank Zarb.

FOSSIL SUBCOMMITTEE MEMBERS IN 1975

Democrats

Ken Hechler, West Virginia, *Chairman*
 Thomas N. Downing, Virginia
 Walter Flowers, Alabama
 Mike McCormack, Washington
 Ray Thornton, Arkansas
 Henry A. Waxman, California
 Philip H. Hayes, Indiana
 Michael T. Blouin, Iowa
 Robert (Bob) Krueger, Texas
 Marilyn Lloyd, Tennessee
 Timothy E. Wirth, Colorado ¹

Republicans

Alphonzo Bell, California
 Gary A. Myers, Pennsylvania
 David F. Emery, Maine
 Larry Pressler, South Dakota ¹

¹ Wirth and Pressler joined the subcommittee later in 1975.

Robert C. Ketcham, a lawyer with wide experience on Capitol Hill in several congressional offices and as special counsel to the Bolling Select Committee on Committees was appointed staff director of the Fossil Fuels Subcommittee. Ketcham had been recruited by committee executive director Swigert at the end of December 1974, before Hechler became chairman of the subcommittee. Ketcham helped write the new energy jurisdiction for the Science Committee, and therefore was very knowledgeable in the area. He assisted in defining the new subcommittee's jurisdiction, which in 1975 included the following:

Legislation and other matters relating to: coal mining technology, coal gasification, coal liquefaction, coal combustion, coal refining and on site processing, coal slurry and transmission, coal waste disposal, fossil fuel exploration research and development, drilling, secondary and tertiary recovery of oil and natural gas, oil shale mining technology, oil shale retorting, oil shale refining and on site processing, special oversight (all research and development related to fossil energy development) and the annual authorization of the Energy Research and Development Administration (ERDA) associated with fossil fuels.

When the 94th Congress adopted its rules in January 1975, for the first time they included this clear stipulation:

The chairman of each standing subcommittee of a standing committee of the House is authorized to appoint one staff member who shall serve at the pleasure of the subcommittee chairman.

SUBCOMMITTEE CHAIRMAN'S APPOINTEES

Now started a great battle of wits which resembled a chess game as Hechler, Brown, McCormack and other subcommittee chairmen attempted to implement the rule which seemed to be very clear and unequivocal. Teague and Swigert firmly believed that the only way to maintain a coordinated committee policy was to make sure that the staff had a loyalty to the committee and its chairman, rather than to any individuals thereon. Therefore, two different letters of appointment were devised for most committee employees hired as a result of recommendation of a subcommittee chairman or the minority, and staff members otherwise hired. The latter were greeted with a warm and more personal letter, while the former were appointed with a rather stiff letter stipulating:

In anticipation of your possible employment by this committee, there are certain procedural matters which should be brought to your attention:

(a) Although you are an appointee of an individual subcommittee chairman, when employed you will be subject to the Committee Rules Governing Procedure as well as staff assignments and direction from the Executive Staff Director or his designee.

(b) Your place of work will be in the offices assigned to the Committee for staff personnel in an area to be determined by the staff director.

Two additional controls were employed: the chairman could set the salary for staff appointees, and an elaborate set of qualifications standards could rule out individuals.

After protracted negotiations which lasted until April 1, 1975, Hechler was finally allowed to designate a staff appointee, David B. Finnegan, who had been Assistant General Counsel of the Department of the Interior and Counsel to the Subcommittee on Environment, Energy and Natural Resources of the House Government Operations Committee. Finnegan's energy and expertise in legislative draftsmanship, public policy and substantive knowledge of the fossil fuels area proved to be extremely effective. What made Finnegan symbolically dangerous to Swigert and some other staff members was that he owed his job to Hechler, and Swigert's suspicion that Hechler was getting from Finnegan some of his ideas which challenged the committee majority. This raised the philosophical and practical question: Is a committee member whose views differ from the committee chairman

entitled to receive staff assistance? Or, put another way, is a staff member being disloyal if he works at the direction of a minority of committee members, rather than falling in line to carry out the will of the majority of committee members? These questions were debated with some emotion, with Finnegan at the center of the discussion.

From Teague's and Swigert's standpoint, they also wanted to make sure that the existing staff was fully utilized. This meant that at the beginning of every Congress, a selling job was necessary to assign staff members to mutually agreeable positions. In 1974, the whole process was in a transition period. No longer, as in the Brooks and Miller days, could a committee chairman dictate which staff would be assigned, without respect to compatibility, to particular subcommittees. On the other hand, there were many subtle ways in which the same objective could be performed within limits. Brown, for example, was not eager to retain Hammill as his staff director, yet kept him on during the 94th Congress. Bill Wells, after working for Milford for several months during 1975, asked to be transferred because of incompatibility and accepted a position as deputy on the Science, Research and Technology Subcommittee until the following Congress.

Throughout, Swigert retained general control by means of staff meetings, general instructions, and the full backing of Teague.

JURISDICTION BETWEEN SUBCOMMITTEES

There were several jurisdictional shakedowns which remained to be resolved before the subcommittees could proceed with their work on the ERDA budget. First, there was the little matter of environment and safety in the ERDA budget. Ordinarily, Brown's Subcommittee on Environment and the Atmosphere would have handled this section of the authorization. But Hechler and McCormack argued that any work on environment and safety was inextricably intertwined with what was being authorized for R. & D. in both fossil and nonfossil areas, therefore should be considered by the Hechler and McCormack subcommittees.

A second dispute arose between Hechler and McCormack over the issue of magnetohydrodynamics—a process of using coal which was burned at a high temperature to convert heat directly to electricity by passing an electrically conducting fluid through a magnetic field. Because the MHD process involved energy conversion, it was initially given to the McCormack subcommittee. Hechler stepped in and contended that because coal was being used to produce electricity the subject belonged in the Fossil Subcommittee. McCormack argued that coal was only incidentally being used in an advanced energy conversion process, which was essentially energy conversion technology.

As the dispute raged on without resolution, Hechler finally said to Teague:

You've got to get us both down to your office and knock our heads together.

The principals and staffs of the Brown, McCormack, and Hechler subcommittees were assembled in Teague's office, and each put his best foot forward. Teague then resolved the two disputes in this fashion: He directed that the Hechler and McCormack subcommittees hold joint hearings on the environment and safety authorization, after which the bill would be sequentially referred to the Brown subcommittee. Teague stated:

This sequential referral would permit the Environment Subcommittee to make independent recommendations to the full committee, should it so desire.

The process worked amicably and well.

Because MHD had been placed under the Fossil Fuels Assistant Administrator, jurisdiction in this area was awarded to the Hechler subcommittee, whose charter was expanded to include "fossil fuel conversion technology (MHD using coal)."

To provide a further opportunity for an informal briefing on the ERDA budget and plans, Hechler hosted a business luncheon with ERDA Administrator Seamans and all the subcommittee members and staff. This event took place a few days before Dr. Seamans presented his testimony in the formal hearings, and proved to be a good (but time-limited) chance to shoot a lot of questions off the record.

COMPRESSED PUBLIC HEARINGS

With only two weeks to hold public hearings, covering a new agency whose budget presentation was generalized and confusing, the subcommittee (of which more than half its members were first-termers) found it had a real bear by the tail. The subcommittee spent the first week of public hearings squeezing as much information as possible from ERDA officials. The second week involved hearing officials from FEA, Bureau of Mines, NASA, two university professors, and representatives from the coal, oil, and natural gas industries.

The subcommittee held four extensive markup sessions early in March, even before going into a joint markup with the McCormack subcommittee, on environment and safety matters. The first issue raised by many members was the fact that ERDA had presented only two figures in its authorization bill: a lump sum for operating expenses, and a \$20 million figure for a clean boiler fuel demonstration plant. The Office of Coal Research as well as the Atomic Energy Commission, transferred to ERDA, had been in the habit of operating on "no-year funds"—meaning that big sums were funded at the start of projects and remained in the pipeline for many years. At the outset of the

markup session, Hechler pointed out how different this was from the experience of the committee with NASA, where items were broken down in detail to give a better handle for oversight operations. Hechler asked: "Do you share that view?" Downing, the ranking Democrat, responded:

Yes, I do share that view, Mr. Chairman, and I'm a great advocate of that, which should be incorporated

LINE-ITEMING THE AUTHORIZATION

Following some discussion of whether to incorporate more specific language in the committee report on the intent of Congress concerning detailed expenditures, Blouin advocated a line-by-line specification of how much ERDA could allocate to each aspect of fossil fuel R. & D. Blouin contended that such an approach would have more "clout" than simply mentioning it in the committee report. Hechler then raised the question for subcommittee discussion of the sentiment on line-iteming which went as follows:

Mr. MYERS. Did we get a feeling anywhere in the hearings that line-iteming would put improper constraints on ERDA because of their infancy? I think that is one consideration.

Mr. HECHLER. In light of the fact that ERDA is a new organization just getting started, we have to allow sufficient flexibility for transfer in the language, but not so much flexibility that they can thwart the will or intent of Congress.* * * I would like to get an expression by the subcommittee as to whether we should proceed toward line-iteming.

Mrs. LLOYD. ERDA is in its embryonic stage, and we certainly should have line-iteming. We are responsive to the voters and taxpayers, and we should exercise this.* * * We will continue to work with them and give them some flexibility. But I think in their beginning stages there is more reason for us to line-item.

Mr. KRUEGER. I think it is appropriate for this subcommittee to indicate the directions for research and development that they would wish ERDA to undertake. Therefore, I would like to see line-iteming done, though I have no objections myself to the clause giving them roughly 25 percent flexibility.

What the subcommittee then did was to take the figures which ERDA had informed them it contemplated on allocating to each sub-area (i.e., coal liquefaction, high Btu gasification, low Btu gasification, MHD, natural gas and oil extraction, etc.) and writing those specific figures into the authorizing legislation, with such adjustments as the subcommittee voted.

Several younger members asked whether it would not be possible to separate out the nuclear weapons sections of the bill, so they did not have to vote for the amounts authorized by the Joint Committee on Atomic Energy but administered by ERDA. Hechler conferred with Teague and reported back to his subcommittee the following day:

This is a joint referral bill, which is referred both to the Joint Committee on Atomic Energy and the Committee on Science and Technology. Chairman Teague and Chairman Price of the Joint Committee have had extensive discussions and agreements on it.

However, Chairman Teague advised me that I should continue to canvass the views of both this committee and of Chairman McCormack, the other Energy Subcommittee, concerning their feelings on this issue. I did have a discussion with Chairman McCormack yesterday afternoon on the issue of splitting the bill. It was his feeling and I think I am representing that feeling fairly that the bill should remain as one bill. However, we will continue to discuss this issue, both in this subcommittee and in the full committee.

Additionally, Chairman Teague indicated that if we favored line-iteming the specific items, such as coal liquefaction, high BTU gasification, and low BTU gasification, etc., that we should go ahead and do that in this fashion in this subcommittee.

NATURAL GAS AND OIL EXTRACTION

One of the hottest fights in the subcommittee developed over an amendment by Krueger to increase from \$24 million to \$34 million the amount funded for natural gas and oil extraction. R. & D. Krueger argued for the near-term payoff in the increase, while the opponents contended that increased Federal funds were either unjustified or would constitute interference. The Democrats generally supported Krueger, Hechler joined with the Republican opposition, and the amendment cleared the subcommittee by 6-5.

Among the other amendments adopted by the Fossil Fuels Subcommittee were the following:

Hechler amendment adopted, adding \$5 million primarily for in situ low BTU gasification.

Hechler amendment adopted, to authorize ERDA to do mining research.

Blouin amendment adopted, to establish an energy data bank in ERDA.

Blouin amendment adopted, to disseminate to the public information obtained as a result of fossil energy R. & D. by ERDA.

JOINT MARKUP ON ENVIRONMENT AND SAFETY

On March 10, the Hechler and McCormack subcommittees had an unusually harmonious joint markup session which lasted two hours, with Hechler presiding over the first hour and McCormack the second. Brown, Goldwater, Ambro, Hayes, and Myers carried the bulk of the discussion during the markup, and the following decisions were reached on March 10:

Brown amendment adopted, adding \$10 million for biomedical and environmental research in support of nonnuclear energy technologies.

Hechler amendment adopted, adding \$5 million for research and development, plus demonstration in coal mine waste disposal, acid mine drainage, coal waste impoundment and embankments, refuse bank fires, in-mine disposal, including

backstowing and back-filling, waste disposal and trace elements in streams and in the combustion of coal.

Hayes amendment adopted, adding \$5 million to establish a new program of scientific and technical education designed to help meet the manpower needs associated with nonnuclear energy technologies.

Hechler amendment adopted, adding \$500,000 to authorize ERDA to make health studies of the high incidence of nonpulmonary diseases among coal miners.

Ambro, during the discussion of the latter amendment, indicated that he had worked with budgets for 16 years and that \$500,000 might buy two garbage trucks, but little more. Hechler responded that he simply wanted to establish the legislative authority for ERDA to get into the human factors involved in expansion of coal mining R. & D.

Between the completion of the subcommittee markup and the full committee consideration of the report, some furious lobbying got underway. First, in response to a phone call from Teague, Dr. Seamans weighed in with two big objections to the subcommittee's actions: The line-iteming and also the dissemination of information. In an April 10 letter to Teague, Dr. Seamans characterized the fossil energy authorization as extremely detailed, necessitating the opening of 16 separate bank accounts with separate budgetary controls. He said he was pleased that the nonfossil programs would be treated in a broad way, as the Joint Atomic Energy Committee had been doing, but he was concerned he did not have the needed flexibility in the fossil area. On the Blouin amendment for the dissemination of information, Dr. Seamans expressed concern that it "would prevent us from accepting and utilizing proprietary information from specific industries which may be needed for our program."

LOBBYING BY BUREAU OF MINES

By far the most active lobbying was carried on by the Director of the Bureau of Mines, Dr. Thomas Falkie. He was seen on Capitol Hill frequently in the next few weeks, and the results of his lobbying were successful. He reacted strongly against the Hechler amendment which authorized ERDA to carry on research, development, and demonstration in the area of coal mining techniques. It was Hechler's aim to help beef up ERDA's work in the fossil fuels area, and to stimulate the Bureau of Mines to get on with a more aggressive program. Dr. Falkie suddenly took on a new level of aggressiveness as he contacted Member after Member to complain about unnecessary duplication caused by the Hechler amendment. His strongest success was in winning sympathy from the chairman and ranking minority member of the House Interior Appropriations Subcommittee, Representatives Sidney R. Yates (Democrat of Illinois) and Joseph M. McDade (Repub-

lican of Pennsylvania.) Yates and McDade rushed off a letter to Teague stating that the Hechler amendment would "duplicate or supersede the present effective and ongoing research so ably conducted by the U.S. Bureau of Mines." They argued, in terms used by Dr. Falkie, that extraction research should be centralized, and that ERDA lacked the trained technicians to do what the Bureau of Mines was doing. They said:

We doubt that the Nation's energy research activity will gain any ground by fragmenting years of technical expertise at Mines, and transferring it to ERDA, an agency with little or no capability in this area.

On April 18, Secretary of the Interior Rogers C. B. Morton sounded a new note of alarm in a further letter to Teague. Secretary Morton said that the proposal "submitted by Congressman Hechler * * * contains ominous implications for the operation of our Government." He also condemned the data bank which he contended would "duplicate efforts of several Government agencies, including those of the Interior Department."

Teague sent a strong response to Secretary Morton, on April 21. The response underlined the legislative authority for ERDA to conduct research in a coordinated way in all energy areas. It was pointed out that the Office of Coal Research, which had been transferred to ERDA, had legislative authority to "develop through research, new and more efficient methods of mining, preparing and utilizing coal." Had the Bureau of Mines been accomplishing an imaginative, innovative and aggressive performance, perhaps the issue would not have arisen. But Dr. Falkie succeeded in stirring up a host of powerful Congressmen when he saw his own turf threatened. Increasingly, he used the theme that all the subcommittee was doing was trying to foster duplication of what was already going on in the Bureau of Mines.

While the active lobbying was proceeding, the subcommittee had a few days of breathing room before the full committee met for a final markup of the bill. To blunt some of the criticisms against line iteming, it was decided to work out reprogramming language which would give ERDA sufficient flexibility and at the same time retain committee oversight and control over the process. Working with Colonel Gould, who had closely followed NASA programs and oversight since the early 1960's, an amendment was developed to make the process in ERDA conform closely to the NASA practices and experiences.

FULL COMMITTEE MARKUP

On April 28, the full committee made its final decisions on marking up the ERDA authorization bill, and a battle ensued. For three

hours and 45 minutes, the committee struggled with controversial amendments to the bill, finally reporting the bill out at 5:45 p.m.

Fuqua first offered an amendment to restore greater flexibility for ERDA by eliminating line iteming. In supporting his amendment, Fuqua stated:

I might point out, Mr. Chairman, we have \$3.2 billion and it contains only 11 items in the NASA budget. And this bill has 16 line items for a sum of only \$300 million authorization. So I think we have reduced this down and it still gives the flexibility that the Administrator of ERDA feels is necessary to carry out a prudent research and development program. * * * Dr. Seamans feels very strongly about not putting him in a strait-jacket.

Hechler replied:

It would seem to me that in order to maintain the appropriate oversight, scrutiny and control over the fossil energy authorization that it is necessary to have the line items which the subcommittee unanimously felt necessary.

Myers spoke against the amendment, while Milford and Mosher spoke for it. On the vote, Hechler used six proxies, but only defeated the amendment with the last-minute support of Teague, Winn, and Goldwater, who switched their votes from "Present" to "No."

Hechler then offered a 3½-page amendment to conform the reprogramming provisions. As explained by Colonel Gould:

As Mr. Hechler indicates, three of these provisions have been in the NASA bill since 1960 and 1961. One provision was added, that is the broad re-programing section, in fiscal 1964.

In the opinion of the staff, these provisions have given us a better insight into what NASA is doing. It forces notification of the committee, thereby giving each Member an indication as to what NASA is doing with regard to its re-programing activities.

It gives us a 30-day period in those cases where funds are being transferred which permits the chairman of the committee, if the committee decided to disagree, to so notify them.

Although the amendment was adopted, Teague was upset with the number of afterthoughts the subcommittee was having. Teague asked:

Was this amendment considered in subcommittee? Do you think it good legislation after the subcommittee is through to come into the full committee and offer a 3½-page amendment?

Hechler responded: "I think it is an excellent idea."

The Hechler and McCormack subcommittees had jointly agreed on authorizing ERDA to undertake R. & D. on the reuse and disposal of coal mine wastes, a section of the bill which aroused the ire of the Bureau of Mines on the grounds it was already doing this work. This prompted Hechler and McCormack to agree on an innocuously worded new section which simply stated: "The Administration shall conduct

an environmental and safety research, development, and demonstration program related to fossil fuels." Bell sought to have the amendment stricken on the grounds that it would create duplication with the Bureau of Mines, and Teague reiterated: "If we did a better job in the subcommittees we wouldn't get into this type of situation." The Hechler amendment barely survived a challenge from Bell, Wydler, and several other opponents.

HOUSE DEBATE ON ERDA BILL IN 1975

The controversies within the subcommittee and between the subcommittee and ERDA should not obscure the detailed work done in bringing out legislation to strengthen the energy resources of the Nation. In presenting the authorization bill to the House on June 19, 1975, Hechler pointed out that in 1970 there had been a Federal investment of only \$12 million in fossil fuels research and development, contrasted with the \$424 million in the bill presented in 1975. This new funding included:

- Five coal liquefaction pilot plants.
- Clean boiler fuel demonstration plant.
- Additional R. & D. in four methods of converting coal to liquids: Direct hydrogenation, solvent extraction, pyrolysis and indirect liquefaction.
- Continue cooperative work with the American Gas Association toward high-Btu coal gasification plant by 1980.
- Construction of a pilot plant capable of converting 50 tons per hour of coal to low-Btu gas.
- Continue work on direct combustion of coal through fluidized bed and other means of burning high-sulfur coal in an environmentally acceptable manner.
- Magnetohydrodynamics and fuel cells R. & D.
- In situ processing of oil shale.
- R. & D. on recovery of clean fuels from oil shale through other processes.
- New methods of recovery of oil and natural gas.

In addition, a vast amount of R. & D. work, systems studies, materials research, and other advanced technological efforts were programed to meet the aim of producing clean fuels for the future. In contrasting the billions of dollars spent on nuclear R. & D., Hechler deplored the pennies which had been invested in fossil fuels, and told the House:

In the near-term, it is absolutely essential that we press forward and place the highest priority on the conversion of coal and on the development of synthetic substitute natural gas and the liquefaction of coal.

Emery opened his address on the fossil R. & D. aspects of the 1975 bill as follows:

I consider this to be one of the most important pieces of legislation that we may consider during this session of Congress.

Downing, Wirth, Myers, and Pressler also spoke out for various portions of the subcommittee authorization in 1975.

Mrs. Lloyd had the honor of presenting the first amendment, which carried very quickly on a voice vote. It was to change a section of the bill which had been written by the Joint Committee on Atomic Energy to rename the Oak Ridge National Laboratory the Holifield National Laboratory, to recognize one of the nuclear energy pioneers in Congress, Representative Chet Holifield (Democrat of California). Mrs. Lloyd's amendment restored the traditional name of Oak Ridge, and named the heavy ion research facility after Holifield.

PRELUDE TO CLINCH RIVER BATTLE

A prelude to the bitter fights starting in 1977 over the Clinch River Breeder Reactor took place in the debate over the amendment by Representative R. Lawrence Coughlin (Republican of Pennsylvania) to cut out funds for the CRBR. The Coughlin amendment was soundly defeated, 227-136, with members of the committee voting as follows:

<i>For Coughlin amendment (against CRBR)</i>	<i>Against Coughlin amendment (for CRBR)</i>
Hechler	Teague
Roe	Downing
Scheuer	Fuqua
Ottinger	Symington
Waxman	Flowers
Hayes	McCormack
Harkin	Brown
Ambro	Milford
Dodd	Thornton
Blouin	Lloyd, Calif.
Hall	Lloyd, Tenn.
Blanchard	Krueger
Wirth	Mosher
	Wydler
Bell	Frey
Jarman	Goldwater
Winn	Esch
Conlan	Myers
Ketchum	Emery

Not voting

When the final vote came on the ERDA authorization bill in the House, the opposition had faded away and the bill passed on June 20 by 317-9.

Up until December 1975, the House and conference committee wrestled with the issue of loan guarantees for synthetic fuels, which will be discussed below. Meanwhile, the subcommittee was very active in other areas.

METHANOL AND COAL COMBUSTION

In June, Hechler designated Emery to chair a hearing on the feasibility of using methanol, made from coal or forest and other waste products, as a fuel. It was brought out that additional R. & D. work might help make the production of methanol more attractive economically.

In July, Myers was chosen as temporary chairman of the subcommittee hearings on coal combustion R. & D. In three days of hearings, the subcommittee inquired into the use of scrubbers to control emissions, coal preparation and beneficiation, fluidized bed furnaces, and flue gas desulfurization. In its hearings, the subcommittee stressed the need for greater emphasis on near-term energy R. & D., specifically the use of coal-oil slurries. Subsequently, ERDA funded a program in this area at the Pittsburgh Research Center. The subcommittee also expressed an interest in broadening the application of fluidized bed technology research beyond the electric utility market, to apply to smaller, industrial size units. This was done by ERDA. Additional subcommittee hearings on near-term energy R. & D. were held in January 1976.

OUTER CONTINENTAL SHELF R. & D.

In July 1975, the subcommittee started hearings on a program of R. & D. to assist in the exploration of oil and gas on the Outer Continental Shelf (OCS). After some success in persuading members of his subcommittee to take on the job of presiding and specializing in different areas, Hechler discovered he had opened a Pandora's box in the OCS area. Having promised the assignment to Krueger, Hechler found that Bell wanted the job instead. Krueger and Bell were so determined to preside that they openly quarreled over the assignment. Bell told Hechler:

I'm the ranking Republican member of your subcommittee, and I've been in Congress for 14 years. Krueger is only a freshman and he doesn't have the experience I have had with the oil business. I think that I deserve to do this job more than Krueger.

Hechler solved the dispute by designating Bell to preside in two days of the hearings, and then Krueger for two days. The hearings themselves were a successful prelude to a carefully developed bill. Testifying were the Department of the Interior, Coast Guard, Department of Transportation, ERDA, NOAA, GAO, Westinghouse Electric Corp., Atlantic-Richfield, Gulf, the University of Oklahoma, and environmental witnesses. The bill directed the Interior Department and the U.S. Geological Survey to consult with the States, conduct studies on

environmental effects, and improve their regulations. ERDA was directed to speed the development of technologies for use in deep waters. The bill authorized the Coast Guard to conduct research in underwater diving techniques and equipment, as well as to conduct a research program to improve oil spill prevention and cleanup.

After several extensive markup sessions in the subcommittee and full committee, an OCS R. & D. bill was reported on April 1, 1976. By this time, the Speaker had appointed an Ad Hoc Committee on the Outer Continental Shelf, headed by Representative John M. Murphy (Democrat of New York). Also, the OCS bill, produced after careful hearings by the Science Committee, was then referred to the House Interior Committee. Despite prodding by the Science Committee, the bill was bottled up and not considered further by the Interior Committee.

SYNTHETIC FUELS INCENTIVES

In his State of the Union message in January 1975, President Ford urged the Congress to provide new incentives for the commercial production of one million barrels a day of synthetic fuel by 1985, which would require the construction of 20 major synthetic fuel plants. The details of a new program were not outlined at that time. When the House of Representatives passed the ERDA authorization on June 20, with only nine votes in opposition, there was strong unity within the Science Committee and the House in support of additional funding for pilot plants and demonstration plants for synthetic fuels. This unanimity was shattered by a surprise development in the Senate.

Without any formal hearings, the Senate Interior Committee reported out a bill in July 1975 to authorize \$6 billion in loan guarantees for commercialization of synthetic fuels. Acting with unusual speed, the Senate passed the bill late on the evening of July 31—the last day of the Senate session prior to the August recess. The bill earmarked \$2.5 billion of the total for coal gasification in section 103. The Senate bill also included a section 102 which authorized ERDA to lease a tract of land from the Interior Department and then re-lease it to private industry for demonstrating in situ oil recovery from shale, after which the land could be turned over to industry for use in commercializing the process.

Congress was in recess in August, but there were a number of long-distance telephone calls from various industrial representatives to Science Committee members, urging them to accept the Senate version as the quickest means of moving forward aggressively to achieve energy independence. Teague, Mosher, McCormack, and a majority of the members of the committee were convinced that the

Senate provision offered a golden opportunity for the Congress to seize the initiative and move the Nation off the dime toward early production of synthetic natural gas, oil, and gasoline.

The day after the Senate acted, on August 1 Hechler wrote to ERDA Administrator Seamans asking ERDA's reaction to sections 102 and 103. Dr. Seamans did not immediately respond, so an urgent inquiry was again dispatched. On September 9 ERDA indicated that the Interior Department opposed section 102 because of its effect on mineral leasing laws, and that although there were problems with section 103, ERDA supported it. Dr. Seamans also recommended in his September 9 letter against using loan guarantees for renewable resources (solar, geothermal, et cetera) which had been included in the Senate bill.

Early in September, Teague assembled the Science Committee members nominated to serve on the conference committee: Downing, Hechler, Fuqua, Brown, Flowers, Symington, McCormack, Mosher, Bell, and Goldwater. A majority of the conferees favored making whatever adjustments were necessary with the Senate on sections 102 and 103, and getting on with the job of bringing synthetic fuels to a point of commercialization. At this stage, Members on both sides of the aisle favored an early meeting with the Senate conferees, to bring the entire authorization bill to the floor so the energy program could proceed. President Ford had remarked earlier in the year that the Congress was "chicken" on the energy issue, and Members did not want this characterization to be proven true. Hechler did not argue substance at the outset, but said he opposed the procedure of accepting a major Senate amendment without a hearing. Teague decided to assemble the full committee for a briefing on September 18 by ERDA and the administration.

REACTIONS TO LOAN GUARANTEES

In advance of the briefing, Teague asked a large number of industrial and environmental representatives to submit statements on their reactions to loan guarantees. Among the organizations supporting early enactment of the loan guarantee provisions were American Gas Association, Texas Eastern Transmission Corp., Dow Chemical, the Oil Shale Corp. ("TOSCO"), Western Gasification Co. ("WESCO"), Pacific Coal Gasification Co., and Koppers Co. Among opponents were Exxon and Union Oil of California, who felt they did not go far enough; and a number of environmental groups. Many respondents urged public hearings.

The committee started to split into two camps: A majority, led by McCormack and most of the Republicans, supported loan guaran-

tees; a minority, led by Hechler and a group of freshman Democrats, with the somewhat independent aid of Goldwater, generally opposed the measure. McCormack's position was further backed up by his experience with loan guarantee provisions which he had written into the solar and geothermal bills which had come out of his Subcommittee on Energy in 1974. As a recognized leader in the energy field, McCormack attracted strong Democratic support for his position, which was later bolstered by additional Republican support when the administration swung around to backing the proposal.

Teague's position throughout was to be fair and judicious in examining the proposal, hearing all sides, and trying to weld a consensus without filibustering or delay. He felt the proposal was needed in the national interest, yet saw the danger in rushing it through without hearings.

In opening the tension-charged September 18 full committee meeting at 8 a.m., Teague mentioned that there were many questions in the minds of the conferees. He told his colleagues that after the September 18 meeting there would be another meeting of the conferees. He noted:

My guess is that they will want to have further hearings on this provision, and if that is the wish of the conferees, that's what we will do. I would hope we could hold them as soon as possible and get through with this thing.

MCCORMACK VERSUS HECHLER

McCormack and Hechler took opposite sides on the role of the committee in the process. Hechler contended the subcommittees should examine all angles of the proposal and then make a quick and responsible recommendation to the full committee for action. McCormack countered that the bill being in conference, the conferees were servants of the House and not of the committee:

Now this committee can take all the action in the world to advise, but its only authority is to advise in this matter.

Hechler asked:

What's wrong with trying to poke this pig and find out whether he really is a pig-in-the-poke, or how much pork chops, ham and bacon are really there?

McCormack noted:

One of the fundamental facts that we're facing here today is that the technology to make that fuel in a pilot plant has been in existence in this country for 4 years, and nothing has been done about it, and mainly because there hasn't been any capital available to do it.

Dr. Robert W. Fri, ERDA's Deputy Administrator, noted that since President Ford's State of the Union Message, an Interagency Task Force on Synthetic Fuels had been studying the subject, and he hoped to have an administration position by September 22. Fri said

the issue was of such high importance it had to be cleared with the President. Hechler asked for an opportunity to examine the as-yet-unannounced administration position through extensive subcommittee hearings, while McCormack contended that a decision could be arrived at within a week of concentrated hearings after the administration forwarded its plan. The general sentiment favored McCormack's position. The issue was complicated by President Ford's announcement, on September 22, of support for a 10-year, \$100 billion Energy Independence Authority (originally proposed by Vice President Nelson A. Rockefeller.) The relationship between the EIA and other incentives proposed by the Task Force was not clearly defined.

On September 25, Fri returned to express the administration's support for two shale oil plants, one syncrude plant, two high-Btu and three low- and medium-Btu and boiler fuel plants to produce synthetic oil, synthetic gas, and electric utility and industrial fuels. He urged deletion of the authority to authorize loan guarantees for renewable resources. Fri outlined a preliminary goal of 350,000 barrels of oil a day rather than an ambitious one million barrels projected by the President in January.

Teague was overgenerous in allowing both subcommittees to proceed with a full examination of both the loan guarantee (section 103) and oil shale (section 102) parts of the legislation. The McCormack subcommittee held five hearings during October on the applicability of loan guarantees to solar, geothermal, energy conservation, waste recycling, and capital formation. The Hechler subcommittee heard 75 witnesses in Washington, D.C., and a three-day field trip which took them to the eastern and western slopes in Colorado to examine potential oil shale operations and social and economic impacts on boomtown communities. Thornton and Wirth presided over most of the hearings. Hechler, Wirth, and Hayes (accompanied by Swigert) made the trip to Colorado.

On October 6, in a surprise move, ERDA Administrator Seamans informed Teague that the administration had withdrawn its objection to use of loan guarantees for renewable sources of energy—solar, wind, ocean thermal gradient, bioconversion, or geothermal. As time went on, the administration offered additional proposals and amendments to meet needs or objections, including the recommendation of an additional \$5.1 billion for price supports and construction grants.

SUMMARY OF HECHLER AND MCCORMACK POSITIONS

Teague convened the full committee on October 30 to give one hour each to Hechler and McCormack to present the results of their subcommittee deliberations. Hechler argued:

What started as a \$6 billion loan guarantee program had now escalated to a \$11.1 billion program, including price supports and construction grants.

Five minutes before the start of the October 30 hearing, Dr. Seamans came in with a 4-page, single-spaced letter, offering a "major new amendment" to provide \$410 million of assistance to communities affected by the new plants. This new amendment deserved to be analyzed.

Insufficient attention to the "boom-town" impact of sudden new expansion of isolated areas where the huge plants, and big big influx of population was contemplated.

Governors and local communities had not been consulted about the impact in their areas.

Little consideration of diversion of huge amounts of water from agriculture and other needs in areas where plants were planned.

Environmental effects of the plants not carefully assessed.

Diversion of capital from housing and other necessary programs.

Protecting large energy companies against risks, but doing little to protect people against human risks, all at public expense.

Synthetic fuels to meet national energy needs required, and the way to speed up production of synthetic fuels can better be done through any of three constructive alternatives:

(1) Immediate establishment of a program similar to the synthetic rubber program so successfully carried out in World War II, whereby the Federal Government supervised the construction of the plants, pooled the patents developed, and did the job like the Manhattan Project or Apollo program.

(2) Establishment of a National Energy Production Board, similar to the World War II War Production Board, which could control the development of synthetic fuels in the public interest, instead of turning tax funds over to those big energy companies which would use them to amass profits at public expense.

(3) A massive expansion of the controlled ERDA effort, with proper anti-trust and windfall profits legislation, to carry demonstration plants one step farther toward commercialization.

McCormack responded:

Loan guarantees are not radically new in the energy field; the committee and Congress already wrote them into the solar, geothermal and electric vehicle acts.

We must act now. The \$6 billion loan guarantee program was dropped into our lap like a fumble in a football game where we found we are on the defensive team. The ball is bouncing around. The question is to pounce on it or not * * *. Earlier this year, the President criticized Congress, saying we were chicken on energy. I say that is unfair. Now, it wouldn't be if we dropped the ball on the \$6 billion.

We have to get at the business of building demonstration programs. We have to face the fact they will cost a lot of money. The money is not out there unless there is some sort of guarantee.

Perhaps it has a lot of bugs in it or some omissions. It is a vehicle that we probably would not have again, if it is dropped. It is highly unlikely that similar legislation could be enacted in this Congress because of the jurisdictional struggles and other political problems that would come up.

This is not an impetuous act. This committee has enacted legislation of more far-reaching, profound impact on this country in much shorter time and with much fewer hearings. The subject has had intense study by the two subcommittees.

We don't have to answer every question now that may arise from these programs. I think if we attempted to do this with all legislation we would never pass anything. Thornton, Bell, and Myers supported McCormack. Thornton stated:

The basic, underlying question which must be resolved is whether this Nation at some point in the future and before the end of this century is going to need to obtain a synthetic fuel capacity. If the answer to that question is affirmative, then now is the time to begin.

TEAGUE A MODERATING FORCE IN CONFERENCE

Following the two-hour hearing, Teague announced that the conferees would meet during the first week in November. Prior to these meetings, the House conferees met and took test votes on a number of the issues which had been raised during the October hearings, but very few actual changes were made. The House conferees found their Senate counterparts very amenable to making changes in the Senate language on the loan guarantee section. Teague joined with Hechler in the support of a number of amendments to do the following:

Provide for review of loan guarantees by the Justice Department and Federal Trade Commission regarding the competitive impact and possible industry concentration resulting from the guarantees.

Provide for State and local review of the siting of synthetic fuels plants, and allowing a Governor to veto a site under some circumstances.

On many occasions, Teague's vote in the conference swung the balance toward modifying the terms of the bill to enhance competition, to provide for assistance to local communities, and to give a voice to State and local authorities. A \$300 million community impact assistance fund was set up. Oil shale development was limited to small size units. More extensive review and safety provisions were included. After a stiff fight with the State Department, which strongly opposed the provision, a requirement was written into the conference report that borrowers and applicants had to be citizens or nationals of the United States.

RULES COMMITTEE ACTION

When the conference committee completed its deliberations on December 8, Teague agreed to allow the House to have a separate vote on sections 102 and 103. He went before the Rules Committee, along with the vice chairman of the Joint Committee on Atomic Energy (Representative Mel Price, Democrat of Illinois) to ask for a separate vote on these sections. It was agreed all around that Hechler would be recognized to make the motion to strike these sections after two hours of general debate.

"Mr. Speaker, this is a most unusual rule on a conference report," Bolling told the House on December 11. He added:

It provides for two specific motions to strike two sections of the conference report, sections 102 and 103. On those two sections, debate is permitted of 40 minutes, 20 minutes on a side, 20 minutes for the proponents, and 20 minutes for the opponents. Thus there will be two 40-minute debates on two different motions to strike.

The two hours of general debate were divided between the Science and Joint Atomic Energy Committees, with the minority in each case entitled to half the time. The Teague forces received several boosts prior to consideration of the bill in the House. On December 9, the Senate endorsed the entire package by the top-heavy margin of 80-10. Also, Brown and Wirth, who had initially opposed the two sections, swung over to support Teague. In a letter which scared the opponents of loan guarantees, Brown and Wirth set forth their arguments as follows:

The bill as amended by conferees contains extensive safeguards regarding such issues as patent rights, state and local involvement, community impact, environmental safeguards, antitrust and implications for industry competition.

While much attention has been devoted to the gasification and oil shale incentives too little notice has gone to the fact that the sections in question provide for a variety of other energy technologies, including biomass, solid waste conversion, solar and industrial energy conservation. In a very real sense this bill represents the first major Federal effort to move these technologies out of the laboratory and into a practical setting.

When a committee does good work, they should receive our support. The House conferees have presented us with a well-drafted bill and we urge you to support it.

Hechler labeled the loan guarantees as—

sort of like attaching a big platinum-plated caboose to the end of the ERDA train. It is very heavy. It is very well-appointed. It is like a private car. It is very difficult for the rest of the taxpayers of this Nation to pull it along * * *. This loan guarantee program extends free enterprise for profits for the big energy companies and socializes the losses.

WALL STREET JOURNAL ATTACKS LOAN GUARANTEES

Just before the battle, an editorial in the Wall Street Journal, attacking the loan guarantee proposal as centralization of Federal bureaucratic power to the detriment of free enterprise, proved one of the important swing factors. Ottinger and Hechler, who were sounding out House Members on their attitudes, quickly discovered that the editorial galvanized conservative Democrats and Republicans into action. They decided to form a liberal-conservative coalition, mobilizing those who opposed using tax money to subsidize big energy conglomerates in bed with those who feared Federal interference in private enterprise. Added to these forces were powerful members of the Appro-

priations Committee, disturbed by "back-door spending" through loan guarantees, and members of any other committee who felt their jurisdiction was being invaded.

Teague possessed tremendous prestige in the House. He had a majority, including the most senior committee members on his side. Nine out of the ten members of the Science Committee who had served on the conference committee were united in support of sections 102 and 103. Powerful House leaders outside the committee, like Representative Jim Wright (Democrat of Texas), spoke out for the proposals. Wright appealed to the House:

May future historians not have to lament that we were too timid to attack the problem, too quarrelsome to get together, and too petty to act

Among other committee chairmen who supported Teague were Representatives Carl D. Perkins (Democrat of Kentucky), Education and Labor; and James A. Haley (Democrat of Florida), Interior and Insular Affairs. McCormack and Mosher carried a big part of the responsibility for marshaling the arguments to support Teague.

It was a very difficult mission for committee members to stage a rebellion against a chairman whose fairness they respected. As Hechler put it:

I would like to add to the many words of commendation that have been expressed here on the floor for the best chairman in this House, the gentleman from Texas (Mr. Teague). He has done what has been said about him and far more in preserving equity and exercising real leadership, and in bringing this bill to the point where it now is. McCormack, who carried a big part of the load during the December 11 debate, stated:

We cannot allow the unknown to frighten us into not acting to solve the energy problem. There will be problems in technical, economic, environmental, anti-trust and water availability areas. We cannot solve every problem before we begin; therefore, we must start and monitor the problems as we learn.

STRATEGY IN HOUSE DEBATE

Hechler's strategy was threefold: (1) To bring up section 103 before section 102, because the loan guarantee section had generated more public opposition and most Members had formed an opinion; (2) to use his 20 minutes to greatest effect by lining up over a dozen speakers from both parties, representing all geographic sections of the Nation and different shades of opinion; (3) by taking very little time to speak himself, and calling a quorum call just prior to the final speaker, who had to be articulate and effective. On the day of the debate, Representative Wayne L. Hays (Democrat of Ohio) approached

Hechler and said he would be pleased to speak against loan guarantees. Hays was in his hey-day, prior to the Elizabeth Ray trouble. Realizing that Hays could prove to be a real bellringer, Hechler asked him to close the debate.

Teague's strategy was to develop the case for loan guarantees through the use of effective committee speakers and respected non-committee Members of the House. Because his speakers were given longer to make their case, there were fewer total than the opposition. The Teague camp underlined the urgency of early action. McCormack pointed out that more oil was being imported than at the time of the Arab oil embargo of 1973. Teague told the story of the 1952 Paley report, recommending action on synthetic fuels which the Nation unfortunately did not follow. Teague played his big trump cards first—Brown and Wirth—the two converts who had originally opposed the proposal.

Wirth was very effective in describing how the concerns of the people of Colorado had been taken care of, and how the safeguards written in by the conference committee had changed him from a skeptic to a supporter. The opposition decided to triple-team Wirth, and one Democrat and two Republican Representatives from Colorado were sent to the well to make brief, punchy rebuttal speeches. Members began to fight for time to get in on the act. As the parade lengthened back of the microphones, the sweet smell of success helped build the momentum for the opposition. Looking over the scene, one of the most conservative Members of the House, Representative Robert E. Bauman (Republican of Maryland) waxed lyrical:

Mr. Speaker, it has been written by an historian that when Stanley and Livingstone met it was like the confluence of the Blue and the White Nile. Their coming together created an impressive force for good that opened a continent. I hope today the union of conservatives and liberals on this issue might have the same beneficial impact.

One of those liberals, Representative Gilbert Gude (Republican of Maryland) asked Bauman to yield, and Bauman shot back:

Mr. Speaker, I yield to my distinguished colleague and friend, the gentleman from Maryland (Mr. Gude), but if the gentleman says that he agrees with me on this or anything else, I may have to change my position.

“SORRY, BELLA”

“Sorry, Bella, I just don't even have 30 seconds of time left to give you,” Hechler told Representative Bella S. Abzug (Democrat of New York). So she pestered Teague until he gave her one minute to make

her case against Teague's position on the amendment. Unfortunately, Teague's sense of fairness in this case did not translate itself into more votes for his side.

Toward the end of the debate, Thornton made a telling point on the investment which consumers had already made in their homes and natural gas appliances for heating and cooking:

That is the reason that the synthetic natural gas proposal is needed. Consumers using those fuels have an investment many times that which would be required to produce synthetic fuel.

"This is not just an oil bill," McCormack proclaimed. "It includes all forms of energy, including solar energy."

After using 14 speakers in 16½ minutes, beating down Ottinger and Dingell to one minute each, the time left for Hays was 3½ minutes. Hechler called the quorum call to insure a big audience for the final speaker. Hays was in top form, and his listeners hung on every word as he led off:

Mr. Speaker, the spirit of Christmas is upon us and this is the biggest Christmas gift to the biggest corporations in the country that I have ever seen since I have been around Washington.

Referring to the fact that the proposal had the bipartisan backing of two Presidential candidates—Republican President Ford and Democratic Senator Henry M. Jackson of Washington—Hays brought down the House with this jab:

You know something, if the people find that out that may be the reason neither one of them are going to be standing out on the East Portico taking the oath of office a year from now.

If the Members want to vote for this just before Christmas and go home and tell their people that as little as this Congress has done for the people, we found time, without any hearings, without any testimony, without any chance to amend it in the House, we found time to give these big companies this gift, they can do so.

If the Members do not believe that these companies have got the money, turn on your television set any evening and if you can get anything on them besides Exxon ads, you have got a better make of television set than I have.

Teague had only 30 seconds left, which was barely enough to clear his throat. He replied:

Mr. Speaker, it is Christmas, and there is no joke. This legislation was started about 25 years ago, and it is time that Congress gave the American people a Christmas present of assuring them that they do not have to depend on the Arabs for energy in this country.

Teague scarcely had time to mention that Exxon had said they were not interested in the legislation. He did not have the chance to refute many of the other statements about the merits of the bill.

HOUSE REJECTS LOAN GUARANTEES

The gavel descended, as the Speaker intoned: "All time has expired." Hechler then sneaked in the last word by propounding a parliamentary inquiry:

Is it correct that an "aye" vote will be in opposition to Section 103 and will strike Section 103 of the pending legislation?

Assured that this interpretation was correct, Hechler then asked for a recorded vote, which came out 263-140 for striking section 103.

The committee members were divided as follows on the loan guarantee provision:

<i>Supporting loan guarantees</i>	<i>Opposing loan guarantees</i>
Teague	Hechler
Downing	Symington
Fuqua	Roe
Flowers	Scheuer
McCormack	Ottinger
Brown	Waxman
Milford	Hayes
Thornton	Harkin
Lloyd (Tenn.)	Lloyd (Calif.)
Ambro	Dodd
Wirth	Blouin
Mosher	Hall
Jarman	Blanchard
Winn	Wydler
Frey	Goldwater
Conlan	Pressler
Myers	
Emery	Bell
Esch	Krueger
	<i>Not voting</i>

The consideration of section 102, which authorized public lands to be leased for an in situ oil shale development, was almost like an anticlimax. Teague obtained unanimous consent to cut the debate to 5 minutes on each side—instead of the stipulated 20 minutes—and immediately yielded all of his time to Wirth. Wirth made a good case that the in situ process was environmentally sounder, consumed less water, produced less waste, required fewer workers and would greatly benefit Colorado and those States where oil shale deposits were plentiful. Representative Frank E. Evans (Democrat of Colorado) supported Wirth's arguments. It looked like there was some momentum going for the advocates of section 102.

Representative Leo J. Ryan (Democrat of California), who had been listening to the debate, interrupted Wirth to ask:

Mr. Speaker, I understand what the gentleman is saying, but I wonder under the circumstances why this was not put in the legislation during the regular committee process? I do not understand why anything that is as important as this should be slipped in here during consideration of the conference report.

It took Wirth precious time to describe the tedious process through which section 102 had been hatched.

THE DEFEAT OF SECTION 102

Hechler had the thankless job of telling his eager conservative-liberal coalition that he had only five minutes of time, and most of them would not get a chance to speak. His strategy was further disrupted by the first sharp exchange of a more personal nature with Teague. During his 30-second leadoff remarks, Hechler referred to the lack of hearings by the Senate, which had introduced the two controversial sections:

I still see no reason why the House should lie down and accept something that was thrown in at the last minute by the other body without full hearings.

Teague sprang to his feet, obviously angered by the remark, and in a tone which revealed his feelings, he thundered:

I am sure the gentleman from West Virginia would not say that the conferees rolled over and played dead on this issue. I think we put up a pretty good fight.

Teague was absolutely right. In a quick calculation, Hechler decided to let the record stand as it was rather than engage in a debilitating, no-win argument which would divert attention from the main issue. He called on Representative James P. (Jim) Johnson (Republican of Colorado) to speak two minutes on the fact that Occidental Petroleum Corp. would be the sole beneficiary of the in situ development, as the only company interested. Dingell roared like a stuck bull when he was informed that he would be confined to only 30 seconds of his carefully prepared oration. About all he could say was that this was a private bill for Occidental. Using the same technique as with section 103, Hechler then asked Representative Patsy T. Mink (Democrat of Hawaii) to deliver a stirring wrapup with a peroration, within two minutes. She threw out a seven-minute speech and did a beautiful job of convincing the House that enactment of section 102 would destroy long-established mineral leasing procedures and replace competitive bidding with favoritism for one large and profitable company.

Surprisingly, section 102 went down by an even larger majority, 283-117. The breakdown of committee votes was as follows:

<i>Supporting section 102</i>	<i>Opposing section 102</i>
Teague	Hechler
Downing	Symington
Fuqua	Roe
Flowers	Thornton
McCormack	Scheuer
Brown	Ottinger
Milford	Waxman
Lloyd (California)	Hayes
Lloyd (Tennessee)	Harkin
Wirth	Ambro
Mosher	Dodd
Jarman	Blouin
Winn	Hall
Frey	Blanchard
Esch	Wylder
Myers	Goldwater
	Conlan
	Emery
	Pressler
<i>Not voting</i>	
Bell	
Krueger	

GETTING READY FOR THE 1976 FIGHT

Teague immediately moved to send the ERDA bill back to the Senate without the two sections, where it quickly passed. There were many recriminations after the fight. Teague felt that the administration, through its late decision, its zigging and zagging on amendments, and failure to make a greater effort in the final stages had contributed to the 1975 defeat. Both sides brushed the dust off and got ready for another round of debate in 1976 over loan guarantees. By now the country had a clearer idea of what was involved in the issue, ERDA had more time for planning, and the legislation itself was vastly improved over the first attempts to jam it through in the late summer of 1975.

Early in 1976, Teague asked 37 companies this question:

Would your company build demonstration plants of a commercial scale without Federal loan guarantees, using existing technology?

Most of the companies responded in the negative.

Working closely with the administration, Teague then drafted a new loan guarantee proposal. His strategy was to make sure that there would be no procedural boobytraps this time. He was determined to develop a proposal which the administration would enthusiastically support, which the energy companies would really work for, and which would also give a full, free, and fair opportunity for the committee and

the Congress to perfect and hopefully vote into law. Committee leaders like Fuqua, McCormack, Thornton, Downing, Winn, and Mosher were dedicated to the proposition that workable loan guarantee legislation was an essential supplement to the ERDA authorization bill in order to move toward a solution of the energy crisis. In the absence of such legislation, a majority of the committee agreed with Federal Energy Administrator Frank Zarb that other energy operations amounted to little more than rearranging the deck chairs on the *Titanic*.

On February 17, 1976, Teague assembled 434 copies of the overview portion of a 4-volume report by the President's Interagency Task Force, entitled "Recommendations for a Synthetic Fuels Commercialization Program." He sent these overview summaries to every Member of the House, with a note which read in part:

WILL YOU STUDY THIS! * * * Synthetic fuels can make a significant contribution to the Nation's supply of oil and gas to bridge the gap between fuel supplies as we know them today and the technological alternatives of tomorrow. Whether this contribution can be achieved depends upon the extent to which prototype projects are undertaken in the future to establish the economics and environmental compatibility of this technology.

H.R. 12112 IS INTRODUCED

Having received assurances from the White House, OMB and Dr. Seamans that the administration would really fight for loan guarantee legislation in 1976, Teague introduced a new bill on February 25, H.R. 12112. The bill scaled down the total amount of loan guarantees from the \$6 billion asked in 1975 to \$2 billion, with the thought that it would be easier to get that amount authorized and perhaps increased later.

On March 31, Teague called the full committee into session for the first of six days of crowded public hearings. Witnesses from the administration, private industry, universities, Governors, environmentalists, Indians, and economists flocked in to give their testimony. The committee members not only sought information but also argued their own points of view, somewhat vociferously at times. Teague singled out the Assistant Secretary of the Treasury as the target for a personal blast at the White House:

Last year from the White House numerous times upon the highest authority we were assured of support and help for this type legislation and we got absolutely none. This bill is not going back to the floor unless we have some assurance they are going to do something besides talk. Just coming here to testify is not enough. I was told yesterday by a former Member of Congress that he bumped into a man from the White House who told him that this legislation was about at the bottom of their priority list up here on the Hill. If that be true, I will quit having hearings and forget it.

Teague generated a new wave of administration support through his critical comments. He also carefully built up additional committee support through his extremely fair approach toward examining all sides of the issue, tolerating adverse witnesses, and allowing some of the 1975 critics on the committee to air their differences. Early in 1976, Ottinger took over firm leadership of the opposition to loan guarantees. Before bowing out of the picture to concentrate on his ill-timed race for Governor and subsequent attempt to return to the House via the write-in route, Hechler stirred the General Accounting Office to furnish what turned out to be a critical analysis of the ERDA loan guarantee plans. He also arranged for the appearance of several Navajo representatives, who spoke movingly concerning the "fear of industrialization on this massive scale" and the "instantaneous onslaught" of coal gasification plants on tribal lands.

OTTINGER TAKES OVER OPPOSITION LEADERSHIP

Ottinger recognized that sentiment for loan guarantees was growing with the committee, and he therefore turned his attention to building another conservative-liberal coalition outside the committee. Teague proceeded methodically to build his forces. On April 14, Teague asked all committee members to submit amendments they wanted to offer. He assembled the full committee on April 27 just to give everybody his say, and to ascertain whether the committee really wanted to go ahead with the bill. Downing observed:

I think the American people and the Congress, too, have been lulled into a sense of false complacency. We have had a mild winter. The oil potentates of the OPEC countries haven't boycotted us, so we assume everything is rosy. It is not. And to put it simply, we know we are faced with a critical energy shortage. This bill, I think, would alleviate that shortage, not do everything, but if we put this off too much longer, we are going to find ourselves in a bind. I would go ahead, pass the bill out and take the first step.

After other pros and cons, including statements from Harkin and Dodd that they might support the bill if the anticompetitive features were improved, McCormack indicated:

I think Mr. Downing made the most important statement here today. We keep acting as if we are not going to have an energy crisis, when indeed our Nation is in extreme peril.

McCormack and Wydler both stressed that it was time to think big, and stop pretending this could be a small businessman's bill. "Energy involves big corporations," McCormack said. "I don't think we should try to delude ourselves it is going to be a boon to the small businessman of the country," Wydler echoed. But Dodd pointed to the extensive work being done by small businesses in the solar energy

area in New England. Scheuer noted that if the big corporations wanted to get in on loan guarantees, they ought to agree to limits on profits and prices. Fuqua, Thornton, Hall, Frey, Emery, Wirth, Myers, and Pressler spoke for the legislation, with only Ottinger and Hechler very strongly opposed. "Time is running out," Fuqua summarized.

MOVING FORWARD ON H.R. 12112

At the conclusion of the session, Teague was sharp and clear:

I think it is obvious that the attitude of the committee is to move forward on the legislation.

He announced the committee would start the next day—April 28—to mark up the bill, and vote each amendment up or down and proceed to report the bill out for action. The process was long and arduous; it took ten markup sessions, one of which lasted four hours. The committee made the following modifications in H.R. 12112, including new safeguards:

- Doubled the limit to \$4 billion.

- Set aside no less than 20 percent and no more than 50 percent for renewable resources and conservation technologies.

- Required public financial disclosure by ERDA officials administering program, to minimize conflict of interest.

- Congressional review of projects over \$200 million.

- Provided for an advisory panel including affected States, Indian tribes, environmental organizations, industry and the general public.

- \$300 million community public impact assistance fund.

The committee voted out the bill by 27–8. Twenty-four committee members cosigned a letter to their House colleagues urging support for the bill. Notable additions to the supporter list, from the 1975 opponents, were Symington, Harkin, Hall, Blanchard, Dodd and Wylder. The eight hard-core committee opponents in 1976 were Ottinger, Hechler, Blouin, Hayes, Krueger, Roe, Waxman and Goldwater, the latter being the only Republican in opposition.

Despite the larger support within the committee, the loan guarantee provisions faced a tortuous road ahead. Three other House committees claimed jurisdiction over its provisions—Banking, Ways and Means and Commerce. The Banking Committee reduced the total to \$3.5 billion but then added \$500 million for price supports. Ways and Means recommended changes in the tax-related provisions concerning municipal bonds for community impact assistance. But the Commerce Committee, of which Ottinger was a member, slashed the bill to ribbons, recommended a new bill for only \$2 billion confined to biomass (various forms of waste), oil shale, conservation and renewable resources.

Both sides began to line up group support. Favoring the bill, in addition to the Ford administration, were the AFL-CIO, the U.S. Chamber of Commerce, the National Association of Manufacturers, the American Gas Association and the oil shale industry. Opposing the bill were a number of economists and conservationists, the United Auto Workers, the Wall Street Journal, and a liberal-conservative coalition. At many different public forums throughout the summer, these groups stated their case, frequently joined by committee members on both sides. McCormack and Mosher were the most outspoken advocates of using loan guarantees as the cheapest solution to the problem of starting a U.S. synfuels industry. Ottinger mobilized an impressive list of House Members of all political persuasions to denounce the bill on the grounds it would "result in misplaced energy priorities, distortion of capital markets, increased concentration in the already powerful energy industry, promotion of obsolete technology, devastation of local communities and great environmental change."

When Teague and the committee went to the White House on May 11, 1976 for the signing of the legislation to replace the science machinery in the White House, he used the occasion to discuss personally with President Ford the need for some strong White House and administration backing for the pending loan guarantee bill. Teague followed up with a letter to the President on June 8, stating in part:

During the signing ceremony for the National Science Policy and Priorities Act, we discussed the Synthetic Fuel Loan Guarantee bill (H.R. 12112). * * * Pursuant to our conversation, I assume that this measure will receive the full support of the administration.

As indicated during our conversation, I am reluctant to bring the measure before the House without some reasonable degree of assurance that the bill will be supported. The President responded that he would help, and he did so with a very strong letter of support as well as turning his lobbying force loose to assist.

Teague also attempted to counter an antiloan guarantee quotation from Democratic Presidential Nominee Jimmy Carter, being used by Ottinger and the opposition forces as one of their talking points. During a visit which Carter paid to the Capitol on August 9, Teague protested to Carter the use of an old quotation being employed as an argument against pending legislation. Following up with an appealing and persuasive letter to Carter on August 11, Teague cited the many virtues of his loan guarantee legislation and added:

I am bringing this matter to your attention because of an effort being made by a few to circulate a statement of yours, made during the campaign, as a basis for alleging

your fixed opposition to this bill. My study of the situation suggests that the statement in question was taken out of context and does not necessarily imply any such position.

Although a letter was not received immediately from Carter, his campaign staff confirmed the fact that it was his policy not to take a position on legislation pending before the Congress. Former Governor Endicott Peabody of Massachusetts, a lobbyist for the synthetic fuels loan guarantees, reported that he had met with Carter on August 29, and discussed the subject at length with him. Peabody, according to a formal statement by Teague, indicated that "Carter told him he has no position on this legislation and has not authorized anyone to speak for him on it."

Even though it is doubtful if this game of one-upmanship really influenced any votes, Teague persisted until he persuaded Carter to send him a personal letter, which he did on September 4. The letter stated in part:

My comments were not directed specifically at H.R. 12112. My general position on synthetic fuels should not be taken as specific opposition to your bill.

Since the full text of the Carter letter of September 4 was never released, it did raise a question of what he had said in the remainder of the letter. But not many people other than the main leaders in the fight paid much attention to it.

GAO OPPOSES LOAN GUARANTEES

Teague conferred frequently with the White House to encourage greater support from President Ford. Meanwhile, Hechler had asked the GAO to provide an analysis of loan guarantees for synthetic fuels. On August 24, the GAO released a negative report which dealt a serious blow to the loan guarantee supporters. The report stated:

In the present circumstances, GAO believes government financial assistance for commercial development of synthetic fuels should not be provided at this time. Full priority should be directed to development of improved synthetic fuels technologies; however, it appears possible to gain adequate information of an environmental and regulatory nature from smaller plants under government control. When commercialization of the technology becomes a prime objective, consideration also should be given to approaches other than loan guarantees for gaining private industry interest.

The GAO Report supported the conclusions of the opponents, stating "Conservation measures are by far the most cost effective way to 'produce' energy and, therefore, should have the top priority for Government financial assistance." About the same time, the Wall Street Journal came out with another critical editorial denouncing the use of Federal subsidies through loan guarantees. The one-two punch

was very disturbing to the supporters of the bill. At 8 a.m. on Monday, August 30, Teague summoned the GAO before the full committee to quiz them on the report and attempt to counteract the widely unfavorable publicity and damage it had done to the bill. Obviously disturbed, Teague addressed an old friend, Phillip S. ("Sam") Hughes, Assistant Comptroller General of the United States:

Sam, you and I have been around this place a long time, we've been working together for a long time, if I remember right, about 25 years. And I think that probably in those 25 years I was most disappointed when I got this report. Now, Sam, I don't know: I thought I knew generally what causes you people to put out reports like this. * * * Now, what I would like to know, Sam, it would seem to me that this is a definite effort to sabotage this bill—to kill the bill, if you want, and it's probably done a pretty good job so far. But who was behind this; who wrote it; who directed it?

Hughes answered:

I'm sorry that you have the reaction that you do to the report. We feel—or we wouldn't have submitted it—that it has a good deal of substantive comment and that it should help in dealing with what is a very complex set of problems. * * * It seems to us that the basic issue is really what the Congress and the Government should do right now about synthetic fuels in the context of a very complicated energy situation.

McCormack echoed the allegation that the report "is to undermine this legislation." He contended that the bill was designed to provide information, "and it's not a commercialization program", therefore the effect of the GAO report "is to prohibit us from knowing." McCormack stated that the GAO report was "based on a number of preposterous assumptions." Various other Members took pot shots at Hughes and the GAO. Teague concluded that the committee would go to the floor with an open rule, giving anybody and everybody a chance to amend or improve the bill. In some exasperation, he asked Hughes:

Now how on God's earth could a committee in Congress come up with a fairer synthetic fuels bill than that? How would you do it? You've had more experience than I have. What would you do? What would you do differently than what we've done?

Hughes responded:

Mr. Teague, I haven't had more experience than you've had, and I don't apologize for that.* * * We are obviously not trying to "do in" the synthetic fuels option. We think it's important to pursue it, and we think it's important to pursue it hard. We think, however, that it is very important to pursue it in a way which doesn't make it preemptive. We are concerned with that, and that's why we have come up with the report that we have come up with. In a personal sense, I can't help but regret that it's causing you, sir, obviously a great deal of trouble.

On the witness stand following Hughes, Dr. William McCormick, Jr., former OMB official and more recently ERDA's Director of the Office of Commercialization, defended the loan guarantee program as "not an effort to permanently subsidize the ongoing production of

synthetic fuels, but rather a carefully limited demonstration of a critical number of first-of-a-kind plants."

TIME RUNNING OUT ON CONGRESSIONAL SESSION

Time was starting to run out on the loan guarantee proposal. Buffeted from many sides, while Ottinger and Hechler were arguing for an expansion of ERDA's existing synthetic fuels demonstration program, the loan guarantees began to gather opposition from some congressional leaders who viewed the plan as the kind of can of worms difficult to perfect at the very end of the session. The coalition of opponents included Representatives Phillip Burton (Democrat of California), chairman of the Democratic Study Group; John Melcher (Democrat of Montana), chairman of the Interior Public Lands Subcommittee; Patsy Mink (Democrat of Hawaii), chairman of the Interior Mining Subcommittee; and influential conservative Republicans John Ashbrook of Ohio and Steven D. Symms of Idaho.

Late in August, Teague, in an effort to get the legislation moving, put together a compromise \$3.5 billion package which melded as many as possible of the recommendations of other committees and his own. He tried without success to get the Committee on Rules to move the bill to the floor. He got the backing of the Banking and Ways and Means committees to support the compromise, but the Commerce Committee balked. Rules Committee Chairman Ray J. Madden (Democrat of Indiana) insisted that his committee would not grant a rule unless Commerce as well as the other three committees directly asked for one. Teague had his compromise package printed in the Congressional Record, because he knew there was insufficient time to get full approval of the compromise, even by the Science Committee. Further dimming the prospects of the bill's passage was the announcement of the Senate Banking Committee Chairman, Senator William Proxmire (Democrat of Wisconsin) that he did not propose to act on the House bill without extensive hearings. The House and one-third of the Senate were eager to clear the decks of legislation and get out to campaign in September.

TEAGUE THREATENS FILIBUSTER

With the clock ticking and the Rules Committee refusing to budge, Teague decided that only a very unusual development would now bring the bill to the House floor. It was a move of desperation. He wrote a letter to Speaker Albert on September 1, 1976:

I sincerely regret that I feel the necessity to write this letter. I think that I have been given a flat "No" on a hearing before the Rules Committee on H.R. 12112, the Synthetic Fuels Loan Guarantees Bill, that I discussed with you yesterday.* * *

The Rules Committee has been kept informed of this bill all the way through and if they were going to refuse to consider this legislation, they could have saved much work in this and other committees. Also, we have had numerous polls which indicate a positive 201 Members committed for the bill and many others semi-committed for the bill.

My understanding is that I have been given a flat "No"; that I will not have a hearing before the Rules Committee. I feel that this action is an absolute insult to my committee. Therefore, I shall take the only action that is left to me. As of September 8, I will object to every unanimous consent request. I shall make a no quorum point-of-order at every opportunity. I regret the necessity to do this, but I feel that myself and my committee, and the other committees that have labored long on this legislation, are not being treated fairly.

Speaker Albert was very understanding, and responded on September 1 to Teague:

Immediately after you discussed this with me, I went to Ray Madden and asked him if he could not have a hearing. He said that it was too late in the session. He advised me that there were apparently some 60 amendments to the bill and that it would be impossible to finish the bill in time to adjourn sine die on October 2. It seemed to me that there was nothing I could do about it.

I will send him a note and tell him how you feel and see whether anything can be done. I do hope though you don't find it necessary to object to every unanimous consent request or make continuous points of no quorum just because one committee chairman has treated you and your committee unfairly.

World War I veteran, 80-year-old Ray Madden had served in the House for 17 consecutive terms since 1943. He had just been defeated in the Indiana Democratic primary, so he had nothing to lose by whatever action he took. It wasn't long before he heard about Teague's threat, and on top of that Speaker Albert and the leadership were vigorously twisting his arm to get the bill out of the Rules Committee. Madden fumed around about Teague's threat, vowing that he would get even if Teague wanted to play rough. It was not long before the press found out about the Teague letter, which proved to be a juicy tidbit when printed. For himself, Madden finally agreed to schedule a hearing for the bill, which cleared the committee by a voice vote, and saved his anger for the floor debate on the rule.

PROBLEMS WITH THE COMPROMISE BILL

Ottinger and his allies scurried around and collected almost 200 signatures opposing the rule when it came up for debate on September 23. He brought the petition to Speaker Albert, who took one look at it and said, "Come back and see me when you have 218." Now the opponents had a new procedural argument: The bill to be debated was not in customary form and had only been printed in the Congressional

Record. There were many new compromise provisions on which there had been no hearings, included were \$500 million in price supports which had been rejected by the Science Committee, and the whole package broke the budget. The opponents argued that at the tail end of the session it would be wiser to proceed with the ERDA R. & D. program already in place for synthetic fuels, instead of taking a chance on this hastily-developed compromise. On the other hand, Teague, and a majority of the committee, backed by the administration and a strong contingent of Republicans argued that the energy crisis was real, positive and speedy action was overdue, synthetic fuels were the clearest answer to the energy shortages, and loan guarantees were the simplest way to meet the demand for capital and get the job done at the earliest possible time.

The opposition got a few new media breaks on the eve of the battle. The Washington Post editorialized:

That bill to subsidize synthetic fuels has more lives than a cat. The House of Representatives threw it out the window last December, but now it's back meowing at the door. The House needs to remind itself that the animal has a voracious appetite.

One committee member was so upset by news coverage that he attempted to persuade the Assistant Comptroller General of the United States to do something to correct it. Lloyd of California said to Phillip S. Hughes during a committee hearing:

I think you are accountable for what is said in these publications.* * * What remedial action have you taken to correct that? Have you sent a letter to the New York Times?

Hughes responded by noting:

The New York Times has got to defend its own honor. I'm working on mine this morning.

RULES COMMITTEE RESOLUTION

A rare type of resolution from the Rules Committee made in order the Teague compromise bill, printed in the Congressional Record as with the solar research bill in 1974 (see page 688). Sisk, a former member of the Science and Astronautics Committee, led off the defense of the rule by announcing that there was "nothing in the world that is more important for this Congress to be concerned with than trying to be self-sufficient with the production of energy." Speaking for the Republican side of the Rules Committee, Representative John B. Anderson decried the talk that the House should "defeat the rule and get home for Christmas." He proclaimed:

Members of the House, if it took until Christmas to deal with this important issue, we should be here, we should be meeting our responsibility.

Mosher urged the adoption of the rule, calling the loan guarantees "the most important piece of legislation before the Nation today." To Ottinger's charge that "it is an absolute outrage that we are asked to consider this complex and very controversial legislation at this time with just five legislative days left in the session," Mosher responded:

I say that I would be outraged if the rule is turned down. That would be an indication that the House is not willing to consider this legislation which is so overwhelmingly needed in the national interest.

Goldwater lambasted the rule for making it "in order to consider a proposal that has to my knowledge only been printed in the Congressional Record in small print, in three columns, for page after page, with no reference points such as numbered lines." He scored the legislation as

a bill that currently makes the Government both the loan guarantor and the lender, that permits a \$25 million oil shale investment to qualify for as much as \$1 billion in Federal assistance, that fosters energy production concentration, that artificially allocates credit and displaces citizens from the capital market, that does nothing to eliminate the existing disincentives, and that will almost certainly necessitate Federal-taxpayer subsidy of the price of the energy produced.

The proponents of synfuels loan guarantees started out with good intentions and motives to produce a thoroughbred energy horse. Unfortunately what we are presented with is at best an energy giraffe.

Frey appealed to his colleagues to move positively:

For 8 years now I have been serving in the Congress, and we have been trying to get some energy program. For 8 years the Congress has been really effective in doing only one thing, and that is doing nothing. * * * We should ask ourselves, what is the alternative? What are we going to do? Where are we going to put the money? Would we rather give \$35 billion next year to the Arab nations to import oil and gas and increase our dependence on these countries, or would we rather take a chance? Would we rather take a risk and put \$3½ billion in loan guarantees and develop new technology? It seems to me we really have no choice. I hope the rule passes and we make needed changes on the floor.

CHARGES AND COUNTERCHARGES

Tempers flared as the hot debate proceeded, with only 30 minutes on each side. Hechler charged that "nobody knows what is really in this legislation," calling it a "mishmash" and "they want us to pass it in a pell-mell rush." This brought Teague to his feet to charge:

If there ever was an unfair statement made in this House in the last 30 years, it was the statement made by the gentleman from West Virginia (Mr. Hechler) about this piece of legislation. If there ever was any Member that got every break a Member could get, he got it. If there is any Member who knows what is in this bill, it is the gentleman from West Virginia (Mr. Hechler).

When I recall what he said about its being a new bill and that nobody knows anything about it, I never heard such an outrageous statement.

Jim Wright tried to get the restive House to focus on the main issue:

Inexorably, just as certainly as the Sun is going to set in the West this evening, the United States is running out of oil and gas. * * * This is a vote for our children and our grandchildren and for the future economic independence of the United States. * * * If we procrastinate and quarrel and delay, we shall condemn the next generation to a drastically declining standard of living.

While all the speechmaking was going on, the opposition had a very effective whip system in operation. Hechler lined up the Black Caucus solidly in opposition, Ottinger worked on the Democratic Study Group, Goldwater helped mobilize Republicans, and others stirred up all those favoring decontrol of oil and natural gas to defeat the rule. Freshman Democrat Hayes grabbed a microphone and called a quorum. "Why did you do that; you're destroying our momentum," one of the ringleaders charged. Hayes whispered: "Ray Madden is ready to give us a stemwinder; I want to get him an audience," Hayes confided.

RAY MADDEN AND THE TURKEY GOBBLER

The Chamber was hushed as Madden delivered what was to be his valedictory after over 30 years' service. Shaking his silver hair for emphasis, his voice quavering with anger and scorn, Madden heaped sarcasm on the bill, which he said "could increase the national debt by over a billion dollars." Throwing away his prepared remarks, he took some sharp, personal jabs at Teague for threatening to hold up proceedings in the House unless the Rules Committee would vote out the legislation. He ripped into the special favors granted to big oil companies and concluded by stating:

Lovable old Sam Rayburn said, "Look out for those turkeys." And this is not only a turkey, it's a gobbler.

On the Democratic side, about 50 Members gave Madden a standing ovation after his six-minute effort. Shortly thereafter, the recorded vote started. The tension rose as it seesawed back and forth.

Outside the House Chamber in the corridors, absolute bedlam reigned as lobbyists, staff members, and friends lined up to shout instructions at Members as they ran the gauntlet and struggled to get through the crush to reach the House floor. The President of Liberia was scheduled to address a joint meeting of the House and Senate at 12 noon. With the House convening at 10 a.m., it was a race against the clock to determine whether debate on the rule could be concluded and a vote taken prior to the time it was necessary to clear the Chamber

to make preparations for the joint meeting. It being Thursday, the opponents of the rule and the bill were apprehensive lest some of the "Tuesday to Thursday Club" Members (most of whom were in the opposition camp) would leave the Capitol and return to their home districts on Thursday afternoon. When 11:30 a.m. arrived and the debate on the rule was still going on, the public galleries were cleared for the Secret Service to send in their bomb-sniffing dogs and check out the security of the galleries. This meant that there was a mass rush as the occupants of the galleries elbowed their way into the already overcrowded area outside the House floor. Just inside the swinging door entrances, the leaders of the battle buttonholed Members as they came in, tailoring their appeals to fit the philosophy and reactions of different Members—even though they had been polled several times in advance.

According to Nancy Mathews, Ottinger's staff assistant who later joined the committee staff:

He was signaling to me how it was going as the vote time ran down—one ahead, two down, all even, and after the 15 minutes were up there were lots of changes. Then right at the end I have never seen such a discouraged look and I was sure we had lost. All of a sudden he jumped about three feet in the air, and then I knew we had won.

At the end of the regulation 15 minutes allotted for a vote, the lights above the Speaker's rostrum showed the incredibly close vote of 190 for and 189 against the rule. The leadership and the whips on both sides went to work in a frantic, last-minute effort to switch votes. Three Republicans and two Democrats who had been registered against the rule were persuaded to change their votes to support.

"Please, Harley, we desperately need your vote against the rule. Can't you switch?" Hechler implored Representative Harley O. Staggers (Democrat of West Virginia). Staggers looked like he might be agreeable to make a switch, but he asked Hechler:

Won't this bill mean greater use of West Virginia coal? How can you vote against that?

Hechler responded:

This bill would mean coal gasification plants in the West, using Western coal, and would actually take a lot of business away from West Virginia.

Staggers said: "That's good enough for me," and put his voting card in the machine to make a decisive switch. Two others switched, and four Democrats and two Republicans came in to cast their late votes against the resolution. Finally, the Speaker pounded the gavel to cut off further voting, after what seemed an agonizing wait. A cheer arose from the opposition: they had carried the day by 193-192, thus killing the bill for the year.

The loan guarantees supporters did succeed in attracting to their side Symington, Waxman, Lloyd of California, and Pressler, who had voted against section 103 in 1975. Conlan switched to the opposition and Blanchard, Harkin, and Hall, who had signed the committee report in May, swung back to the opposition on September 23. On the vote, the committee members divided 21-11 in favor of the rule. Several members told Teague they would change their votes if he wanted to pass the rule, but he declined.

LOAN GUARANTEES FOR BIOMASS

Loan guarantees were inserted in a minor way in the ERDA authorization conference report which passed the House on September 30, 1976, but did not pass the Senate, and did not in fact become law until the following year. The conference report required ERDA to obtain congressional approval on a project-by-project basis for any guarantees for coal gasification or oil shale development. But the legislative history indicates the central purpose of the legislation relating to loan guarantees was to fund \$300 million for biomass commercial demonstration facilities. The following colloquy between Goldwater and Teague on September 30 confirms this fact:

MR. GOLDWATER. Would the gentleman agree that title VII is only for biomass and further, that, under the language in this title of the conference version, no other technologies could be given loan guarantees, so as now written it is not for coal gasification or oil shale, among others?

MR. TEAGUE. I agree with the gentleman. The conference provision is completely limited to biomass loan guarantees.

The provision on loan guarantees for all energy resources was eventually included in new legislation which President Carter signed in June 1977.

MORE SUPPORT FOR COAL

Despite their concentration on loan guarantees, members of the Fossil Fuels Subcommittee did not let up in their efforts in 1976 to push forward the frontiers of research in the entire area. The subcommittee worked for months to beef up the fossil programs. At the urging of the Hechler subcommittee, the full committee and House added \$55 million in 1976 to various coal, oil, and natural gas programs in the areas of coal gasification, liquefaction, and direct combustion, including environment and safety programs. These increases were not enacted until the next Congress convened in 1977.

The subcommittee held a very useful, productive six days of hearings on "Coal Mining Research and Development." Among the issues tackled were methane recovery in advance of mining; develop-

ment of a longer length oxygen self-rescuer; and additional funding for education and training programs in the coal industry and its R. & D. arms. On September 16, 1976, as a direct result of the subcommittee's hearings, ERDA and the Department of the Interior signed a general memorandum of understanding on their relative roles in coal mining R. & D. Secretary of Commerce Elliot L. Richardson remarked at the Hechler coal mining R. & D. hearings on September 16, 1976:

It seems to me that these hearings represent an admirable example of the oversight function. I think that the role of the Congress in legislating sometimes inappropriately tends to eclipse the role of the Congress in finding out how effectively the legislation it has already enacted is being administered.

Your question with respect to the priority of health and safety, for example, under the 1969 act, is illustrative of this. I feel that we in the executive branch have an affirmative responsibility both to account for what we are doing and to cooperate in accomplishing the objectives established by the Congress.

Hechler reminded Secretary Richardson that "the Federal Coal Mine Health and Safety Act of 1969 contains a very ringing preamble, which states, 'The first priority and concern of all in the coal mining industry must be the protection of the health and safety of its most precious resource, the coal miner.' " He went on to stress that, at a time when the Nation was turning to the coal industry for increased production, the record of 1,103 coal miners killed since January 1, 1970 "is a totally unacceptable record of safety." Hechler emphasized that safety and environmental measures must go hand in hand with increased coal production.

During 1976, Hechler designated Pressler to preside over hearings on the development of alternative technologies to transport coal by pipeline. The hearings covered the current technical and economic feasibility of long-distance coal pipeline transportation and alternative transportation technologies for development of low-sulfur coal in the West. Among the alternative technologies considered were coal-water slurries, methyl-coal mixtures, pneumatic pipelines and unit trains. The issues discussed by the members included the safety of the pipelines, the possibility of converting abandoned pipelines to the transportation of coal, water degradation and alternative uses of water.

WALTER FLOWERS TAKES OVER SUBCOMMITTEE

Walter Flowers would rate as the finest storyteller of the committee, a man who can go very quickly to the heart of any problem, and whose air of casual unconcern masks a finely honed legal mind.

First elected to the House in 1968, Flowers did not join the Science Committee until his second term. His interests at first concentrated on NASA, a big employer in Alabama, and science policy as well as scientific education. Since his days as president of the student body at the University of Alabama, Flowers always had a particular interest in the educational process. Tuscaloosa, his hometown where he practiced law, is a university town. Flowers gained national renown in 1974 when the Nation discovered his oratorical excellence during the televised impeachment proceedings of the House Judiciary Committee. At that time, he took an early position in favor of impeachment, when his district was strongly behind President Nixon. His subsequent successes in House races showed this did not hurt him politically, but he was defeated in the 1978 Democratic primary in his attempt to obtain the U.S. Senate nomination. Flowers' interest in energy did not blossom until he turned down the chance to serve another term as subcommittee chairman on the Judiciary Committee in 1977, in favor of taking over a Science Subcommittee chairmanship.

In 1977, the Fossil and Nuclear Energy Subcommittee included:

Democrats

Walter Flowers, Alabama, *Chairman*
 Marilyn Lloyd, Tennessee
 Thomas J. Downey, New York
 Doug Walgren, Pennsylvania
 Bob Gammage, Texas
 Wes Watkins, Oklahoma
 Mike McCormack, Washington
 Dale Milford, Texas
 Ray Thornton, Arkansas
 James H. Scheuer, New York
 Richard L. Ottinger, New York
 Robert (Bob) Krueger, Texas
 Robert A. Roe, New Jersey
 George E. Brown, Jr., California
 Tom Harkin, Iowa
 Jim Lloyd, California

Republicans

Gary A. Myers, Pennsylvania
 Hamilton Fish, Jr., New York
 Barry M. Goldwater, Jr., California
 Manuel Lujan, Jr., New Mexico
 Harold C. Hollenbeck, New Jersey
 Robert K. Dornan, California
 Edwin B. Forsythe, New Jersey
 Louis Frey, Jr., Florida

When Flowers took over the Fossil and Nuclear Energy Subcommittee in a surprise choice in 1977, he enjoyed the opportunity to exercise much broader jurisdiction, added to the committee's responsibility with the abolition of the Joint Committee on Atomic Energy. The full name of the Flowers subcommittee was Fossil and Nuclear Energy Research, Development and Demonstration.

During February 1977, the Flowers subcommittee conducted hearings on the new budget. There was the usual early confusion at the start of the Carter administration over who was in charge of what and which figures would be supported. The confusion was further compounded by the sudden reincarnation of the ERDA authorization bill which the House had approved in 1976, but the Senate had failed to pass. To make everything legal, at the beginning of 1977 this bill was also reintroduced and rushed through the House in April. In calling the full committee together to act on April 20, Fuqua announced on behalf of the chairman:

It is felt strongly by Chairman Teague and many of us on the committee that it is imperative that we exercise our responsibility and pass an authorization bill for ERDA. What is proposed and reports will be made by the chairman of the two respective subcommittees is basically to pass the same bill agreed to in conference and passed in the House last year.



Representative Walter Flowers (Democrat of Alabama), center, chairman of the Fossil and Nuclear Energy Subcommittee. From left, Thomas N. Tate (staff counsel), Representative Marilyn Lloyd (Democrat of Tennessee), Flowers, Robert C. Ketcham (staff counsel), Representative John W. Wydler (Republican of New York).

Fuqua and Wydler, members of the House Government Operations Committee, played active roles in helping to shape the legislation recommended by President Carter for the establishment of a new De-

partment of Energy in 1977. Wydler expressed concern that the research-oriented ERDA staff might not be fully equipped to handle the major, near-term challenges to DOE in the areas of regulation, allocations and the pricing of oil and gas. ERDA was folded into the new department, which also included many other energy operations in the Department of Interior, Federal Power Commission and other agencies. Even though the Department of Energy did not start effectively functioning until 1978, it simplified considerably the work of the committee. For example, the committee no longer had to referee interagency squabbles or run the gauntlet of agency lobbying based on protection of jurisdictional turf rather than the substantive merit of legislation. The Bureau of Mines, much of which was transferred to DOE, no longer lobbied as strongly against attempts to coordinate their efforts. The committee found the coal mining R. & D. program weak, and lacking in focus and capable management.

AD HOC COMMITTEE ON ENERGY

Speaker O'Neill decided to establish an Ad Hoc Committee on Energy, chaired by Representative Thomas L. Ashley (Democrat of Ohio) in order to pull together a coordinated House effort on President Carter's new energy program. On April 1, Teague wrote to Speaker O'Neill:

I read in the newspapers, and I hear rumors and it seems well known that you intend to appoint a Select Committee on Energy. I would hope that my committee would be represented in the best possible way, and I would like to recommend Honorable Walter Flowers, Chairman of the Subcommittee on Fossil and Nuclear Energy Research, Development and Demonstration, and Honorable Mike McCormack, Chairman of the Subcommittee on Advanced Energy Technologies and Energy Conservation Research, Development and Demonstration.

What subsequently happened could have been accurately predicted by anyone who knows Mike McCormack. McCormack works while others sleep. He touches all the bases. He goes directly to the sources of power. He points to the fact his district is traditionally Republican, therefore the Democratic leadership owes him recognition to retain his seat. He is respected, within and outside Congress, as one of the most knowledgeable experts in all areas of energy. He is not bashful in insisting that he be given every possible opportunity to exercise and apply his knowledge. Hence it was that through successive appointments by Miller and Teague, McCormack was given a chance to vault over several more senior Members to become chairman of the task force and later the Subcommittee on Energy. Those positions entitled him to build on his reputation and be in line for other re-

sponsibilities. In 1975, McCormack had learned of the impending establishment of a House-Senate task force on energy, charged with developing a congressional policy on energy. He went to Speaker Albert and had little difficulty persuading the Speaker to assign him to the new task force. Nothing was said, however, about the fact that the Science Committee had two subcommittees on energy, and deserved two spots on the task force rather than one.

So it should have come as no surprise when 1977 rolled around, history repeated itself, and McCormack beat another path to Speaker O'Neill's door to obtain assignment to the Ashley Ad Hoc Committee on Energy. As fast as you could ask "Am I my brother's keeper?" Speaker O'Neill promised McCormack there would be no problem. Of course, McCormack reminded the Speaker of the promise on frequent and appropriate occasions. Meanwhile, Teague told both McCormack and Flowers that he had suggested their names to the Speaker, since they both chaired important energy subcommittees. Now let's tune in on Flowers:

Tiger had said the Speaker had said there would be two Democrats—and he was going to suggest my name and McCormack's because we were the two and I assumed that was settled. So I never did go any further on it. I thought everything was taken care of.

Flowers was sitting in his office minding his own business one day, and he flipped on the closed circuit television of the House proceedings to hear the Speaker name the members of the Ad Hoc Committee on Energy. According to Flowers:

He goes through the list. He goes through it in terms of seniority, and he goes right past where Flowers ought to be, and McCormack is named. And on down the line. There was only one guy from the Science Committee, and it was McCormack. It took me about thirty seconds to get from here to the House Chamber and I was talking to the Speaker then. And I said: "Mr. Speaker, what the devil is going on? I thought I was going to be on that committee." He said: "Walter—Walter, I didn't know you wanted it. And this guy McCormack, he's hustling me every day about it. I didn't know you wanted it."

I said: "Mr. Speaker, I sure do. That's the most important thing I'm fiddling with this year. I've got to be on that committee." He said: "I'll take care of it."

So, true to his word—and he is a dear friend of mine and I have worked very closely with him—before the day was over they had created two additional Democratic positions on the Ad Hoc Committee on Energy, and one additional Republican position, and named additional Members, and slid us in.

Teague of course was incensed when he heard what had happened. He immediately dictated a letter to the Speaker; even though Teague's letter arrived after the problem had been solved, it expressed his personal reaction to the incident:

I think that I would be a poor committee chairman if I did not tell you that I feel my committee was short-changed by your appointments to the Ad Hoc Committee on Energy.

I doubt that you realize or dream how much work our committee has done and will do in the field of Energy. I guess that I was naive to think my recommendations would have any weight.

I was more than disappointed that Walter Flowers was not appointed to this committee. Walter Flowers is chairman of one of my energy subcommittees. He has shown much interest; he has done a great job and I am sure will continue to do so.

Personalities, the presence of two highly visible energy subcommittees, and shifting administrative arrangements for energy in the executive branch all contributed to clashes between the two subcommittee chairmen handling energy. Flowers understated the strong competition between McCormack and himself when he observed:

We're friends. We've had minor trench warfare from time to time—nothing serious.

Ketcham and Andelin, the two subcommittee directors, entered into the competitive spirit in what Flowers termed "a little sideline action" while the main game was progressing close by. As a result, by early 1978 the relations between the two energy subcommittees had deteriorated as they struggled for jurisdictional supremacy over various segments of the DOE authorization. Controversies boiled up as to whether certain developments in heat engines, combustion systems, nuclear physics and nuclear science, and advanced technology and assessment projects more properly belonged as conservation and basic research with the McCormack subcommittee or whether they had completely fossil and nuclear implications which justified their assignment to the Flowers subcommittee.

Teague tried in vain to persuade McCormack, Flowers, and their staff directors to come up with a formula which would result in a workable compromise. Instead, the battling became worse. Finally, Teague called on Dr. Jack Dugan and asked him to sort out the competing claims and suggest a compromise. At extended sessions in Teague's office, attended by Committee Staff Director Mosher, Deputy Director Gould, and Dugan, an equitable division was worked out in each of the areas of dispute. A sample of the delicacy of the compromise is contained in the following paragraph, which covers only one phase of the jurisdictional settlement:

Improved conversion efficiency.—Work on heat engines and high temperature (greater than 200° F) heat recovery is closely tied to combustion and related materials technology. On this basis the heat engine and high and medium grade heat recovery (from conservation) and combustion systems should be assigned to the Flowers subcommittee. The low grade heat recovery activity is a new advanced technology conservation R. & D. program and should be assigned to the McCormack subcommittee.

Fuel cells are electrochemical in nature, major departure from heat engine systems for their power generation, and the technical challenges to development are in lower temperature materials. This activity should be assigned to the McCormack subcommittee.

Mosher and Colonel Gould, in a March 9, 1978 memorandum to Teague set forth the complete details of the Dugan compromise. Teague immediately dispatched the terms of the compromise to both Flowers and McCormack. He wrote them each a blunt letter giving them 24 hours to file any objections to the plan. Neither objected, the compromise was praised by both subcommittee chairmen at a subsequent full committee meeting, and the issue was settled. The jockeying for position continued, but the major points of disagreement were imposed through the process of binding arbitration.

LOAN GUARANTEES IN 1977

The loan guarantee issue boiled up again in the spring of 1977. Once more, Ottinger led an effort to try and stave off authority to use loan guarantees for huge coal gasification and oil shale operations. He supported the use of loan guarantees for biomass and geothermal development. On May 10, 1977, during a full committee markup of the ERDA authorization, Goldwater and Ottinger both endorsed language to encourage loan guarantees for geothermal projects. Ottinger told the committee:

Language has been worked out to my satisfaction, at any rate, but I would like to see language in the report making it quite clear that this is not to be a back door means of financing through loan guarantees either coal gasification or nuclear or other energy resources.

Goldwater responded: "I would concur with the gentleman."

On May 12, the committee debate suddenly took an acrimonious turn. Flowers offered an amendment reviving the authority which the House had rejected in 1975 and 1976. Teague commented:

I would like for the committee to know that there has been much conferring with the administration over this amendment. * * * I went into the other room there and called Dr. Schlesinger and asked whether I could say to the committee that this was the administration position, that he was for the amendment. Dr. Schlesinger said: "You may say that and you may use my name as being in support of it." He also called this morning and said the administration is not for any commercialization of technology. They would not ask for a penny to be used for commercialization of technology (through loan guarantees.)

Ottinger protested vigorously that the committee and the House had gone through the loan guarantee issue "ad nauseam" in 1976. Fuqua, Frey, Myers, Watkins, and Wydler all spoke for the Flowers amendment. Ottinger said it wouldn't improve the bill's chances on the floor "if I am steamrollered." The big difference in the 1977

approach was that loan guarantees were incorporated into the ERDA authorization bill, instead of being in a separate bill, as in 1976. Also, the Flowers amendment initially did not contain the safeguards which had been written into the prior legislation on such issues as community impact, State and local partnership, anticompetitive features, and congressional review. Not until Goldwater called attention to the unfairness of jamming the amendment through in 10 minutes was there an opportunity afforded for some of the safeguard amendments to be considered. Wirth's amendment incorporating the 1976 safeguards was carried.

Wydler signaled that he had studied the loan guarantee concept, which he once characterized in 1975 as "some sort of ripoff of the American taxpayers" and had some new thoughts in 1977:

I started out frankly in the last administration, one of my party, when this program was first proposed, very suspicious of it and cynical about it. Slowly, over the year or more that we have considered it, I have become more convinced that actually this program is absolutely essential to the future energy resources of the Nation.

Fuqua concurred, adding: "I think it is vital that this country get moving in the area of synthetic fuel."

Obviously, the sentiment in the committee and the Congress was changing. Ottinger alone signed a minority report, reiterating the position he and his colleagues had taken in 1975 and 1976. He also produced additional correspondence from the General Accounting Office, including a May 9, 1977, letter to Teague which stated in part:

We continue to believe that—in lieu of providing Federal loan guarantees for commercial-size plants—efforts should be directed to researching and developing improved emerging energy technologies until their technical, economic, environmental, socioeconomic and regulatory problems are resolved. We continue to believe also that information on these problems can and should first be obtained from smaller than commercial-size plants.

NO LOAN GUARANTEES FOR COMMERCIALIZATION

But by the time the bill reached the floor for House debate, it became evident that the Department of Energy was not all that excited about loan guarantees. In letters to Teague and Dingell, Secretary Schlesinger underlined his conviction that they should be used only for new technology, and not for large commercialization of old technology as was possible under the 1975 and 1976 proposals. Ottinger told the House on September 21, 1977:

I refrain from another effort to delete these provisions this year only because of my confidence in the honor of the gentleman from Texas, our good chairman, Mr. Teague.

He held endless hearings on these provisions to hear the environmental, community and budgetary problems with these provisions. He supported the numerous protections we added. * * * He has acted with the utmost of good faith and with infinite patience. The House is weary of dispute on this issue, and it would be a substantial imposition, having had these many protections adopted, to put our colleagues through this fight again.

In a further colloquy with Teague, Ottinger sent up a flag of truce which was gracefully accepted.

The old fight over loan guarantees was overshadowed by the more serious battle over the Clinch River Breeder Reactor (see next chapter.) The legislation including the loan guarantee authority was signed by the President in February 1978. On April 3, 1979, the General Accounting Office confirmed the fact, in a letter to Senator Henry M. Jackson (Democrat of Washington), that up to that time the loan guarantee authority had not been used for synthetic fuels. In addition, the optimism for the use of loan guarantees to enable municipalities to launch biomass demonstration programs was not borne out, as they were not used for this purpose either. On a very limited scale, the loan guarantees were used in connection with solar and geothermal projects. In 1979, there was a revival of interest in synthetic fuels in connection with the Defense Production Act, as well as sweeping proposals by the President in a nationwide address on July 15, 1979. Once again, "synfuels fever" swept the Congress.

OVERSIGHT BY FLOWERS SUBCOMMITTEE

In addition to its extensive work on the Department of Energy authorizations during 1977 and 1978, the Flowers subcommittee conducted a number of successful oversight hearings. The first of these, convened on July 12, 1977, covered the market oriented program planning study being completed by ERDA. The study had been started in January by a 70-member task force, which helped provide an information base for both the Congress and the administration to assess proper levels of energy research funding. The information and projections presented to the subcommittee concluded that whereas deregulation could significantly increase natural gas supplies, oil deregulation would not have much effect on the amount of primary oil recovery because of the relatively small amounts of undiscovered domestic oil.

In November 1977, Mrs. Lloyd presided over hearings entitled "New Technologies for Old Fuels." The subcommittee examined the success the Germans had on a small scale in World War II in fueling their war machine with coal-derived fuels. The subcommittee also received testimony on the use of peat and wood as fuels.

During November 1977 and May 1978, the Flowers subcommittee held oversight hearings on the role of the national laboratories in

energy R. & D. Originally created by the Atomic Energy Commission in the research and development of nuclear power, the role of the laboratories in developing energy technology and the general advancement of science had long interested the Science Committee. Flowers, Mrs. Lloyd, Brown, Ottinger, and Wydler were active participants in this series of oversight hearings, which for the first time brought all the laboratory directors together before a congressional committee in public session. Wydler stated at the outset that one of the major concerns of the subcommittee should be to insure that the national laboratories not be submerged "by the regulators, who will be playing the more important role of handling the day-to-day problems of allocating energy in our Nation, and deciding how much it's going to cost." He urged that special care be taken that regulation not rule research, and that the role of the Federal laboratories be protected. His sentiments were shared by the subcommittee, which indicated that while harnessing the valuable near-term contribution of the laboratories toward meeting energy needs, the long-term necessity for protecting research was essential for future progress.

Staff members Dugan and Tate stressed the quality of NASA and aerospace technical programs to provide a benchmark for DOE. This approach provided a standard for evaluating the quality of DOE project management in the field and headquarters program management. It was a useful tool for committee oversight.

CLEAN AIR STANDARDS

On the closing day of the Department of Energy authorization hearings in 1978, the subcommittee had a lively interchange with Dr. Stephen J. Gage, Acting Assistant Administrator for Research and Development at the Environmental Protection Agency. Flowers opened the hearings by observing:

I need to know how much cross-fertilization there is or should be between your operations and the Department of Energy. It occurs to me that we have saddled DOE with the responsibility of making a large part of this decision perhaps in concert with you, and I would like to feel assured that is what is happening. But I have the feeling that it is not.

Dr. Gage responded:

I think both agencies recognized from the beginning that the shoe had only begun to pinch when we had to come to grips with the kind of issue before us today.

The subcommittee learned that by happenstance many DOE employees concerned with the issue had prior experience and were alumni of EPA. Flowers, Myers, Frey, and Lujan pushed the EPA officials very hard on whether EPA's new source performance standards were so strict as to prevent new technologies like fluidized bed combustors, solvent refined

coal or MHD from being developed, even though they were environmentally more attractive than current coal-burning methods.

Flowers posed this conclusion:

The greatest challenge we have—or one of them—in our time right now is to balance the legitimate concerns of a clean environment against the critical need for energy in this country and in the world. I just hope that somehow, somewhere in this maze that the energy side of the equation is getting a fair shake.

In April 1978, the Flowers subcommittee followed with two days of additional hearings on the effect of the clean air standards on new energy technologies and resources. The first day's hearing featured power company executives and engineers in a panel discussion, with the second day being devoted to EPA, DOE and Interior Department officials. It disturbed Flowers to hear the Interior Department witness say they could live with the EPA clean air standards, and he stated:

I don't want to appear argumentative, but the environmental impact of your statement on me is that the Department of the Interior does not perceive an energy crisis. I am concerned that two out of three statements this morning do not really address the energy crisis which is the paramount problem in this Nation today, which affects our economy and our quality of life. * * * Do you people in Interior concern yourselves with the overall energy problems as a Nation? Are you thinking about the national parks and maybe a few oil leases on the Outer Continental Shelf?

MHD

Both the Hechler and Flowers subcommittees in the 94th and 95th Congresses voted vastly increased funding for magnetohydrodynamics (MHD). Subcommittee members believed that the program showed a great deal of promise for enabling the generation of electricity from coal in an environmentally sound and efficient fashion. The Hechler subcommittee had probed the expenditures on MHD carefully to insure that the construction funds and R. & D. were fully justified rather than being hurriedly allocated in response to heavy political pressure from Montana legislators. When ERDA reprogrammed \$20 million of funds into MHD in 1976, the subcommittee met to assess the relative benefits of the higher expenditures for MHD as against the near-term funding of improved coal combustion, out of which the funds were being transferred.

In opening three days of oversight hearings on the MHD program in May 1978, Flowers declared:

The program has jumped from \$7.5 million in 1974 to a projected \$70 million in 1978. Program goals have accelerated, increasing the emphasis on systems development for rapid commercial application. Early milestones, though, have slipped. The work at several locations is not organized as a program, and specific project assignments and costs have escalated. The program has been the source of congressional enthusiasm with large benefits only to specific regions and specific contractors. That

makes it somewhat difficult to give MHD a balanced consideration with the other long-term energy options, such as breeder, fusion technology and solar electric technology.

One of the most outspoken advocates of MHD on the committee was Gore, who on several occasions elaborated on the pioneer MHD work which was being carried on by the University of Tennessee at Tullahoma.

The Flowers subcommittee heard witnesses representing major component manufacturers, MHD test facility centers, government laboratories involved in MHD R. & D. and the Department of Energy. In a report published in October 1978, the subcommittee reached encouraging conclusions concerning the future development of MHD, but recommended a tightening up of administrative management and control over the programs being developed at Butte, Mont.; Tullahoma, Tenn.; and Pittsburgh, Pa.

A large number of field trips and on-the-spot inspections were undertaken by the Flowers subcommittee and staff. Committee members and staff visited coal conversion facilities in Leatherhead, England and Westfield, Scotland, in addition to coal liquefaction and coal mining operations in the United States. The staff also inspected fluidized bed pilot plant sites, the MHD program development in Montana, and the Pittsburgh Energy Technology Center.

CONSTRUCTION OVERSIGHT ON COAL LIQUEFACTION

Two significant staff investigations were undertaken at the coal liquefaction facility at Cresap, W. Va., and the H-coal liquefaction plant at Catlettsburg, Ky. Both reports were prepared by Ron E. Williams of the committee staff. During the January 1978 DOE authorization hearings, serious questions were raised by the Flowers subcommittee as to the increased cost and lack of productivity of the Cresap facility. Originally constructed by the Consolidation Coal Co. in 1966, the Cresap operation was developing a process to convert coal into gasoline. After being taken over by the Office of Coal Research in the Department of the Interior, the plant was deactivated in 1970 and reactivated after the Arab oil embargo in 1974. The subcommittee staff discovered that corrosive elements had destroyed much of the equipment and piping in the interim. Technical difficulties repeatedly plagued the operation. The staff report concluded:

The project was entrusted to a private firm and the Government completely failed to exercise any real supervision over the project. Cost, schedules and technical control were almost totally absent in that the Government did not assign a project manager with authority to make decisions across the technical, administrative and contractual spectrums. In other words, no one was in "charge."

The report recommended no further funding for the Cresap facility, except for placing it in mothballs, which was done.

At the close of 1978, Williams submitted a highly critical report on the H-Coal Liquefaction Plant in Catlettsburg, Ky. The report found:

Most all pipe and conduit is already rusted. Supplies of new pipe, valves and expensive components have been literally thrown in the mud during off-loading from trucks. * * * Labor productivity on the project was totally unacceptable. * * * The Department of Energy's top echelon has not dedicated the manpower required to adequately control a job of this magnitude. There is only one single solitary government official on site at this \$300,000,000 project. To gain perspective, the price of this construction and first two years of operation is the same as all of NASA's shuttle facilities at all NASA centers, albeit in later year money. NASA, however, employed roughly 200 Civil Service construction specialists to control the same priced work.

The investment in construction was so far advanced as to make it not feasible to terminate the construction. However, as a result of the scathing report by the subcommittee, radical management changes were instituted. In particular, the management and project accountability were transferred to the Oak Ridge National Laboratory, which had the experience and professional people necessary to manage such construction work.

FLOWERS SUBCOMMITTEE INFLUENCE ON APPROPRIATIONS

Sprinkled through House Appropriations Committee reports in 1978, the second year when Flowers chaired the Fossil and Nuclear Subcommittee are references to the initial recommendation and findings of the Science and Technology Committee. These testify to the closer working relationship with the appropriations process which Flowers established. Before Flowers became chairman, the House Appropriations Committee usually ignored or openly fought recommendations by the Science Committee. Although Hechler was personally friendly with Representatives Tom Bevill (Democrat of Alabama) and Sidney R. Yates (Democrat of Illinois), chairmen of the comparable Appropriations Subcommittees, one of the difficulties was that Hechler's subcommittee in most cases recommended increases over the budget for fossil fuels R. & D. This resulted in confrontations occasionally extending to attempts to amend the appropriations bills on the floor, which in most cases were beaten down. After some initial failures in 1977, in 1978 the Flowers subcommittee used a different approach: Deep cuts were made in outdated technologies in the fossil area, which were respected and frequently adopted by the Appropriations Committee. This not only made it possible to make some modest increases in promising technologies, but it also cemented closer relationships with the Appropriations Committee which respected the

preliminary work done by the Science Committee. Myers, the ranking minority member on the Flowers subcommittee, commented in a floor speech on July 14, 1978:

The committee in the coal area realized that the time had come to begin looking seriously at the various programs that have been funded over the years in the old Office of Coal Research in the Department of the Interior, in ERDA, and in the Department of Energy. We found that we were able to pick some winners and losers * * * and I am happy that the committee had the courage to admit that certain projects were just not working.

One of the most tumultuous, complex series of negotiations in which the committee engaged involved the Department of Energy authorization bill in 1978. While ERDA had existed, it was a relatively simple matter to separate out those R. & D. portions which related directly to the jurisdiction of the Science Committee. However, when the Department of Energy sent up its mission-oriented budget, it became extremely difficult to disentangle the various portions which pertained to the House committees claiming jurisdiction. On January 27, 1978, Teague wrote to Speaker O'Neill noting that there were several areas of committee jurisdictional overlap in the DOE authorization bill. Teague introduced a new bill which clearly contained only those R. & D. matters within the Science Committee's jurisdiction. When the Science Committee had completed its work, this legislation was sequentially referred to the Commerce and Interior Committees. Along came the DOE omnibus bill, which was jointly referred to the Science, Commerce, Banking, Interior, Armed Services, and International Relations Committees, giving rise to new jurisdictional problems. Some very sticky confrontations developed, with demands and counter-demands flying between committees and their staffs, and joint agreements were extremely difficult. Even though there was a final compromise worked out on the R. & D. portions of the DOE authorization, and the compromise was published in the Record, the bill itself did not receive final approval in the Senate by the close of the 1978 session.

In 1979, the fossil fuels R. & D. programs were taken over by a new subcommittee headed by Representative Richard L. Ottinger (Democrat of New York). The leading environmentalist in Congress, outspoken advocate of solar energy and conservation, opponent of over-reliance on nuclear fission and organizer of the congressional Environmental Study Conference, Ottinger's views frequently clashed with those of a majority of the committee. Ottinger's leadership on issues like opposition to loan guarantees and the Clinch River Breeder Reactor and strong support of all forms of renewable resources revealed an ability to mobilize citizen groups to rally to his cause. Unlike

Brown, who shared many of Ottinger's views, he was a polarizer who frequently stimulated knee-jerk pro or con reactions to the issues he espoused. For example, at the Democratic caucus meeting of the committee on February 1, 1979, Ottinger was the only nominee for subcommittee chairman who stimulated strong opposition. Ottinger was elected by the narrow margin of 14-11, revealing occasional negative feelings which his views or tactics generated within the committee.



Representative Richard L. Ottinger (Democrat of New York) third from right, along with Subcommittee Staff Director James W. "Skip" Spensley, second from right, and Representative George E. Brown, Jr. (Democrat of California), right, on a field trip to the Department of Energy's Fast Flux Test Facility in Richland, Wash. Others in photo are associated with the facility and include, from left, R. Ferguson, A. Fremling, and A. Squire.

First elected to the House in 1964, Ottinger has represented two different Westchester County districts. After three terms in the House, he received the Democratic nomination for the Senate in 1970, but lost the general election in a three-way race. Following the retirement of liberal-Republican-turned-Democrat Ogden Reid from the House, Ottinger ran for Reid's former Westchester County seat and was elected along with a large group of the "Watergate Class of 1974." He first joined the Science Committee in 1975, just in time to get in on the committee's expanded jurisdiction. A graduate of Harvard Law School, cofounder and former Peace Corps official, internationalist, and militant liberal, Ottinger can always be found battling for consumer and environmental issues.

In 1979, the Ottinger subcommittee was renamed "Energy Development and Applications," with the following jurisdiction:

Legislation and other matters relating to research, development and demonstration programs in fossil energy R. & D., solar applications, solar technology, advanced energy technology, energy conservation, biomass; and policy and management programs of the Department of Energy.

The members of the subcommittee at the start of 1979 were:

Democrats

Richard L. Ottinger, New York, *Chairman*
 James J. Blanchard, Michigan
 Doug Walgren, Pennsylvania
 Dan Glickman, Kansas
 Albert Gore, Jr., Tennessee
 Robert A. Young, Missouri
 Richard C. White, Texas
 Harold L. Volkmer, Missouri
 Howard Wolpe, Michigan
 Nicholas Mavroules, Massachusetts
 Bill Nelson, Florida
 Beryl Anthony, Jr., Arkansas
 Allen E. Ertel, Pennsylvania
 Kent Hance, Texas
 Robert A. Roe, New Jersey
 Mike McCormack, Washington

Republicans

Hamilton Fish, Jr., New York
 Ken Kramer, Colorado
 William Carney, New York
 Donald Lawrence Ritter, Pennsylvania
 Robert W. Davis, Michigan
 John W. Wydler, New York
 Robert K. Dornan, California
 Robert S. Walker, Pennsylvania
 Bill Royer, California



Representative Kent Hance (Democrat of Texas).



Representative William Carney (Republican of New York).

James William "Skip" Spensley served as staff director of the Ottinger subcommittee, starting in 1979. Spensley had been staff director of the Brown Subcommittee on Environment and the Atmosphere from 1977 through 1978 (see chapter XX).

Among the basic decisions made by the subcommittee in 1979 was to add authorization for building a second solvent refined coal (SRC) liquefaction plant which had originally been included the prior year but not finally enacted. DOE recommended that when it came time to build, two processes would be competitive (solid product or liquid product), and DOE would choose one of the two for construction purposes. The subcommittee decided not to force the processes to be competitive, on the other hand projected future hearings on coal liquefaction to more thoroughly examine the two processes and DOE's policies with relation to them. The subcommittee also directed DOE to submit its project plans before construction got underway.

The subcommittee generally supported the DOE effort in 1979 to modify the coal mining R. & D., and reorient the program toward meeting productivity and environmental standards. This approach reflected the skepticism with which the committee had viewed the lack of progress in the old Bureau of Mines R. & D. efforts, which the committee had criticized in the past and which only recently had been transferred to DOE.

Following a practice started in 1975, the subcommittee decided to line-item projects which would enable tighter congressional oversight over construction operations especially since there had arisen a habit of utilizing operating funds for this purpose. With the spotting of many management problems in construction, the subcommittee concluded that DOE by law would henceforth be required to submit an approved project plan—including engineering design and a firm management plan—before starting site acquisition and construction.

The subcommittee also took the initiative to add funds in 1979 in the following R. & D. areas: Anthracite mining, fuel cells, combustion systems, heat engines and heat recovery, MHD and enhanced gas recovery. In the latter area, an Ertel-Watkins amendment added \$5 million more in the full committee markup, and Ottinger also added on \$5 million in full committee for fuel cells R. & D. The subcommittee also made cuts in a number of less productive proposals, and the full committee resisted several additional cuts proposed by Walker in the interests of fiscal responsibility.

During the House consideration of the Department of Energy authorization bill on October 11, 1979, Fuqua successfully sponsored amendments which added \$7.5 million each for three new demonstration projects to convert coal to synthetic liquids and gases. These included coal liquefaction, low BTU gasification, and coal-to-methanol.

Shootout at Clinch River

Thirty miles west of Knoxville, Tenn., on the north side of the Clinch River, there are about 100 acres of rolling, heavily wooded land. This is the site of the controversial \$2.6 billion Clinch River Breeder Reactor. It is a project which had been strongly supported by President Nixon in the early 1970's, also favored by President Ford, opposed by President Carter and backed by a majority of the Science Committee. The CRBR was the source of many bitter clashes between the Congress and the President, along with many unsuccessful attempts to arrive at compromises which neither side would fully embrace.

Since World War II, the United States has been working to develop the breeder reactor, so named because it produces more fissionable material than it consumes. An important part of the development program has been the concept of eventually building a demonstration plant, a mid-sized breeder that would provide data on economics, safety, plant performance, and other factors. President Carter opposed the CRBR at the start mainly on the grounds that the production of plutonium would lead to the proliferation of nuclear weapons among many nations. The Science Committee vigorously fought for the continued funding of the CRBR, in the face of a veto as well as consistently adamant opposition from the White House.

PRESIDENT CARTER OPPOSES THE CRBR IN 1976 CAMPAIGN

When the Flowers subcommittee started its work in February 1977, there was still uncertainty in the White House as to how much would be budgeted for the CRBR. From the President's statements during the 1976 campaign, it was fairly certain that he would oppose the project. But a clear-cut policy was not announced until April. In the interim period, the subcommittee held an extensive series of briefings on all aspects of nuclear policy, followed by hearings to assess ERDA's tentative budget of \$150 million for the CRBR. In terms of timing, the preliminary plant design had been completed and component procurement for the project was under way at a rate of about \$15 million per month. However, no clearance work had yet been undertaken at the site six miles from Oak Ridge, Tenn., where the trees still remain.

A COLLISION COURSE

On April 20, 1977, President Carter announced his decision to terminate the CRBR and called for an energy plan which would constitute "the moral equivalent of war." Instead, the committee declared war on the President's proposal. The President asked for \$33 million to phase out the project, and set a collision course with the Congress.

McCormack was the first to speak out sharply against the President's decision, and he argued that the problem of nuclear weapons proliferation had been exaggerated:

As far as we know, there's not been a single nuclear weapon made anywhere on earth from the nuclear fuel cycle. It's far cheaper and easier to make them outside the fuel cycle.

Throughout the Clinch River debate, Mrs. Lloyd took the lead in supporting continued progress toward construction of the facility. Her initial effort, voted by the subcommittee, was to broaden the CRBR project to one which could employ the thorium cycle, producing U-233, instead of plutonium. In the full committee, Mrs. Lloyd supported Flowers' move to fund CRBR with \$150 million and initiate hearings in June. Harkin led a group of 12 supporters of the President's position, including two Republicans (Fish and Pursell).

Teague told the May 11 full committee meeting that he had "tried all day yesterday through a series of meetings to work out a compromise that we could agree on." He announced his support for the Flowers proposal to hold full-scale hearings. "We should give the President some time," Teague said. Flowers added:

I would approach the further hearing, Mr. Chairman, with a completely open mind on the whole subject. I would hope that the other Members would too, with no predisposition of support or non-support of the Clinch River program or any other breeder program that we might have.

"CLINCH RIVER IS A DOG"

Ottinger, who wanted to go even farther than Harkin and strike out funding of components for Clinch River, stated:

Clinch River is a dog. It has proved to be a dog technologically and economically. It is well time we got rid of it as very undesirable excess baggage. I think we ought to get rid of it as a whole and go look at other alternatives that may be safer and not threaten the lives of the people on the earth.

This prompted Flippo to observe with a slight tinge of sarcasm:

I am glad to see the gentleman is not prejudiced with regard to Clinch River and I am sure that when the gentleman takes part in the hearings that will be held, that he will approach it with an open mind.

The colloquy then went like this:

Mr. OTTINGER. Some philosopher once said that an open mind is the equivalent of an empty head.

Mr. FLIPPO. I agree to a point. [Laughter.] * * *

Mr. MCCORMACK. I too approached this from a completely open mind. [Laughter.] * * *

Wydler and McCormack delivered strong statements in support of the CRBR, with Downey and Harkin speaking against. Wydler contended that "we can't stop the manufacture of gunpowder because it might be used for war purposes." McCormack pointed out:

It is much cheaper, cleaner and simpler and the weapons are ten times more efficient if you make them outside the nuclear fuel cycle.

Downey said the relative dangers of gunpowder and plutonium could hardly be equated. He charged that further hearings to delay the issue were really to stimulate some lobbying. Harkin indicated that voting \$150 million would be endorsing Clinch River, and that the committee shouldn't push ahead prior to negotiations with other countries to try and discourage a plutonium-based economy.

After voting down the Harkin amendment by 26-12, and burying the Ottinger amendment by voice vote, the committee on May 11, 1977, voted its refusal to go along with President Carter's recommendation to cancel the CRBR.

At Flowers' instigation, the full committee put in one sweetener desired by the administration, to allow the Government to charge higher prices to domestic and foreign customers for uranium enrichment. It was estimated that this provision would enable the Federal Government to recoup an additional \$120 million over the coming year. Because the administration was eager to have this provision incorporated, Flowers and the committee felt that it might help make the administration perhaps a little more willing to sign the bill despite the hardnosed opposition to the CRBR.

TEAGUE LEANS TOWARD OPPOSITION AT START

In the early months of 1977, while in the Naval Hospital in Bethesda, Md., from his leg amputation, Teague began to study and receive briefings on the CRBR from a number of experts. Dr. Edward Teller, "father of the hydrogen bomb" and a nuclear enthusiast, made several visits to the hospital and talked about Clinch River. Dr. Teller was skeptical about the CRBR, felt it was an attempt to use outmoded technology, and relayed these thoughts to Teague.

John F. O'Leary, who became Under Secretary of the Department of Energy, also visited the hospital and talked with Teague. Members of the Nuclear Regulatory Commission and the nuclear industry were also invited for conversations. Many of the briefings started at 6:30 p.m. in a 10th-floor anteroom at Bethesda Hospital. Among Members of Congress, Fuqua, Wydler, Brown, Flowers, and McCormack were frequent visitors. Teague related to his colleagues in 1977:

At the time that this responsibility was given to our Committee, I had a slight mobility problem. But, immediately after that happened, I began to hold afternoon and evening meetings at Bethesda Hospital with the great help of a man named John O'Leary, the Undersecretary to the new Energy Department, who I think is a great and dedicated American. I began thinking on their side. I began believing the President was right, but the further I went and the more I learned, the more I decided that the President was wrong.

Teague found O'Leary to be very objective in his presentations and discussions, even though he clearly sided with the President. The turning points for Teague were the trips which he took in the late spring of 1977. He took his committee for a first-hand look at the area of the CRBR site, as well as what was developing in other nations concerning breeder reactors and the use of plutonium. On May 20, 1977, five committee members—Teague, Flowers, Ottinger, Mrs. Lloyd, and Myers plus Representative John J. Duncan (Republican of Tennessee) visited Oak Ridge and conferred with the project managers of CRBR as well as DOE headquarters personnel. The session was held in a steaming hot building at the CRBR site. This was not just a casual look-see. They probed into issues like why the project was needed, what would be lost if it were terminated, reasons why the costs had escalated so sharply, the public safety risks, and the relation of the CRBR to proliferation—among other questions.

From the standpoint of the committee, the atmosphere and the arrangements for the briefing were far from perfect. The overcrowded, overheated building was jammed with project personnel which made direct questioning by committee members difficult. The CRBR project officials seemed intent to stick to a prearranged "show and tell" presentation, instead of concentrating on answering the questions on the minds of committee members. Teague impatiently attempted to zero in on the central issues which were concerning the committee, but it was an uphill fight. Finally, with some exasperation, he passed along the word that the briefing would be terminated so that the committee and staff could return for their flight back to Washington. Disappointed, the local project managers and Department of Energy personnel brought their presentation to a rather abrupt conclusion. The committee members were glad they had made the trip, even though they did not obtain answers to all the questions they had on their minds.



Visit to the site for a firsthand look and discussion of the proposed Clinch River Breeder Reactor: From left, front row, Representatives Gary A. Myers (Republican of Pennsylvania), Richard L. Ottinger (Democrat of New York), Walter Flowers (Democrat of Alabama), Olin E. Teague (Democrat of Texas), Marilyn Lloyd (Democrat of Tennessee); and John J. Duncan (Republican of Tennessee).

THE OVERSIGHT INVESTIGATION IN EUROPE

At the end of May and early June 1977, Teague led an 8-member committee delegation on an oversight trip to Europe. In the investigation they conferred with officials of the International Atomic Energy Agency and French Atomic Energy Commission, and visited the site of France's operating breeder reactor, the Phénix, which is approximately the size of the proposed CRBR. Those making the trip were Teague, Wydler, Milford, Myers, Scheuer, Harkin, Dornan, and Hollenbeck. As noted in chapter X, Wydler submitted two reports and also wrote to President Carter following the trip, decrying the apparent fact that the United States was slipping in breeder reactor technology and yielding leadership to European nations.

One of the most impressive parts of the trip was the visit to the International Atomic Energy Agency in Vienna, Austria. On May 29, 1977, the congressional delegation had a lengthy question-and-answer session, led by Dr. John A. Hall, the American Deputy Director for Administration of the Agency. Represented at the meeting were Poland, Austria, Belgium, Norway, the United Kingdom, the U.S.S.R.,

Japan, Sweden, and France, as well as the American Ambassador to Austria, Galen L. Stone. As the meeting was getting underway with appropriate introductions, Teague and Dr. Hall had the following interchange:

Mr. TEAGUE. Doctor, do you think you can be objective to us or not?

Dr. HALL. Objective?

Mr. TEAGUE. Yes.

Dr. HALL. Sir, I will be objective and balanced. * * *

Mr. TEAGUE. I didn't say "you"; I said the rest of you.

Dr. HALL. If they are not, I'll be the first man to curb the passion, as it were.

At one point in the discussion, Teague asked:

Did you people have an input, do you think, on President Carter's announcement? Did the Carter Administration consider what your organization thinks and what you are trying to do?

Ambassador Stone answered:

I would say that the answer is generally "yes"—not in every detail, but there was a definite impact on the program of the present Administration as a result of consultations with the International Atomic Energy Agency.

But a few minutes later, when Myers posed the same question, Dr. Hall had this to say:

Could I make a short answer? A great deal of the President's policy was news to us.

STRATEGY AND THE RETURN FLIGHT

As the committee members and staff flew home from their European trip, a considerable amount of time was spent devising plans for the June 7 committee hearing. Teague and Wydler, along with Dugan of the staff began to map out their strategy. Wydler concluded that he would attack the administration policy directly. On the other hand, Teague decided he would sit back and listen to both sides, but he had little doubt as to how he would vote.

FLOWERS LEANS TOWARD SUPPORT OF THE CRBR

The Flowers subcommittee opened four intensive days of its promised hearings on Clinch River on June 7. In his opening statement, Flowers mixed very objective language with inferences on how he stood on the issue. He stated:

These hearings are meant to provide a forum for clear presentation of the underlying issues for, at the moment, it is the task of this Subcommittee to shape a program which will provide the best technical base for whatever nuclear energy or nonproliferation policy is chosen.

The questions posed at the start of the hearings tended to indicate the trend of Flowers' thinking:

What will be the financial costs of the termination? What will be the costs in technical leadership for breeder technology? What will the impacts be on the technical community which has been gathered for the effort? And finally, if we terminate now to find that we must restart the program later, how can we minimize the effects of the shift by a thoughtful structuring of the underlying research and development program?

Yet if anyone had difficulty ascertaining Flowers' basic viewpoint on the CRBR, such was certainly not the case with Wydler. On June 7, Wydler announced as the subcommittee hearings opened:

Mr. Chairman, I believe that the issue we are reviewing this morning has arisen as a result of a seriously misguided policy. The chairman of the full Committee, Mr. Teague, myself, and other committee Members have just returned from discussions with officials of foreign governments and the International Atomic Energy Agency on the breeder question.

There is overwhelming evidence that the Clinch River decision will not slow other nations' breeder programs one bit.

Further, it is clear that unilateral action by the United States outside the existing international mechanisms for modern safeguards is an unfortunate strategy. If the policy is indeed a well-informed attempt at reducing proliferation of nuclear weapons, I think we are proceeding in exactly the wrong direction.

BROWN OPPOSES THE CRBR

During the June hearings, Brown through his questioning emerged as a strong opponent of the CRBR. But the subcommittee majority quite clearly indicated that its position was stiffening. The full committee met on June 14 to take another vote on the CRBR, after the Flowers subcommittee had recommended by 17 to 7 to stick by its guns and continue to support a funding authorization of \$150 million. Flowers stated his position to the full committee:

What was once a prudent approach to increased electrical power and a wise husbanding of world uranium supplies is now being presented as a threat to world peace and a tool for nuclear weapons proliferation. * * * I share the President's deep concern about proliferation of nuclear weapons, but I do not feel that by continuing the work begun for a liquid metal fast breeder reactor we are furthering proliferation, but rather furthering the demonstration of technology which may be needed in the years ahead.

On the negative side, Harkin and Fish argued that to limit the CRBR to \$33 million would still leave close to \$500 million in the bill for further breeder technology and that the time had come to start emphasizing alternative sources of energy. Downey produced a letter from Secretary of Defense Harold Brown, underscoring the dangers of nuclear proliferation. Mrs. Lloyd, Wydler, Lujan, Myers, and Goldwater all spoke for keeping the figure at \$150 million. McCormack warned that to cut back CRBR would mean:

The anti-nuclear activists will come roaring in with all sorts of lawsuits under NEPA and the Atomic Energy Act in which they will hope to delay any modification of the program for another five years.

"WE POOR MORTALS"

As the moment approached for a vote on Downey's motion to reduce CRBR funding to \$33 million, as requested by the President, Flowers, acting as temporary chairman of the full committee soliloquized:

We poor mortals are called upon to referee what the experts can't agree upon here. That is the problem. We have to come down on one side or the other. That is exactly what we are going to do now. Call the roll.

The result was pretty much as anticipated. The Downey motion went down by 19 to 11. Now the center of action turned toward the Senate.

Led by Senator Frank Church (Democrat of Idaho), the advocates of the CRBR did not do quite as well as had the House and put through an authorization of \$75 million. Meanwhile, the Science Committee ran into some trouble with the Appropriations Committee, which was coming in with funding decisions in June before the authorization bills had reached the House. As Flowers put it:

Mr. Speaker, let me say to my colleagues in the House, "Get your bags packed and hold on to your hats, because you are getting ready for the ride on the Appropriations choo-choo. It is going to be moving through here fast. Whether or not your authorization bills are ready, it matters not. The Appropriations Committee is ready and they are coming at you full speed ahead."

Flowers tried without success to stop the Interior Appropriations Subcommittee from jumping the gun, and mustered only 65 votes in trying to block that effort. He had a little better luck with the Public Works Appropriations Subcommittee. This was fortunate because, along with their running fight with President Carter over water projects, the Appropriations Committee had sided with the President in recommending a slash down to \$33 million for the CRBR. Flowers argued quite convincingly that the future of nuclear power development should not be decided as a side issue to the "hit list" of water projects the President opposed. "We feel like we're being shunted aside," he observed ruefully when the public works appropriation bill came up. But he convinced his colleagues to delete the CRBR money from the pending bill and wait for a full-dress debate on the CRBR when the Science Committee presented its authorization bill in September.

NO DOUBT ABOUT MCCORMACK'S STAND

Long before the Science Committee started wrestling with the Clinch River issue, Mike McCormack as a member of the Joint Committee on Atomic Energy had been deeply immersed in the details of the CRBR and why it was necessary to proceed with liquid metal fast breeder reactor technology. McCormack had been firmly committed for

many years. He had heard all the arguments and was impatient with the counterarguments and the delays thrown up by environmentalists, intervenors, and antinuclear protesters. By the time the Science Committee had inherited jurisdiction over the CRBR with the abolition of the Joint Committee in 1977, McCormack was way ahead of everyone else in a thorough knowledge of the technical aspects of the project.

Dr. John P. Andelin, McCormack's former administrative assistant and by now staff director of McCormack's subcommittee, could see the bloody and fruitless battle ahead between the President and Congress. On a number of occasions early in 1977, Dr. Andelin tried independently to see if some accommodation could be worked out, particularly in the selection of other breeder or nuclear strategies which might enable the possible scaling down of the CRBR. Meanwhile, McCormack tried for six months to get through a phone call to Frank B. Moore, Assistant to the President for Congressional Liaison. Dr. Andelin reported:

I called about once a month, and said I would like to talk at their convenience to Frank or to any designated deputy to discuss nuclear. To my knowledge, Frank Moore's office has never returned a call to Mike's office.

I WANT TO SEE THE PRESIDENT

Finally, McCormack himself called the White House and said he would like to see President Carter. An appointment was arranged for July 1, 1977. McCormack spent a week working on a letter to hand deliver to the President when he saw him. The third page of his letter was double spaced and was literally pulled from the typewriter because there wasn't time for it to be typed in final form. As a result, McCormack was five minutes late for the appointment at the White House.

McCormack's letter to the President indicated that the Congress would likely fund the CRBR, and add support to the reprocessing facility at Barnwell, S.C. He praised the President's stand on nuclear weapons proliferation, but added:

However, the reaction has been negative to your suggestions relative to the breeder and reprocessing. Most of the nations of the world will free themselves from any dependence upon the United States for nuclear fuels as quickly as possible. The result will be international confusion and an enhanced possibility of nuclear weapons proliferation.

McCormack then suggested that there be a one-year delay in construction of the CRBR, with a funding level of \$75 million (the amount suggested by the Senate.) He then stated that the President should "announce a commitment to develop a breeder technology, so that commercialization can be undertaken when and if necessary." The letter was quite blunt in stating:

Your approach is mistaken. In attempting to suppress the development of LMFBR technology, as if it in itself uniquely contributes or constitutes the threat of nuclear weapons proliferation, you are not only missing your target but you are losing your support and credibility.

"I'M JUST LISTENING"

Dr. Andelin, who was in on the Friday afternoon meeting with President Carter, recalls:

The President listened, relatively distantly. He asked questions that were basically hostile to breeder technology. At one point, he said, after he was very quiet for a long time and Mike was talking on: "Don't take my silence to mean anything besides that I'm listening very carefully. It doesn't mean that I'm agreeing or disagreeing—I'm just listening."

Dr. Andelin drew the conclusion that there was no communication between the two principals, that they were talking past each other, and that nothing either of them said changed or even affected either person's mind. Subsequently, McCormack referred to the President's position as "irrational", and presumably based on a campaign commitment from which he couldn't escape.

July 1, 1977 fell on the Friday prior to the Fourth of July. Teague had given his hard-working staff an extra day off to furnish them a long holiday weekend. In midafternoon, he was called at home and asked about the circumstances of McCormack's meeting with the President. Having no knowledge of the meeting, Teague was at first puzzled, then curious, and finally angry. It was pointed out to Teague that the morning Washington Post had carried McCormack's name on the President's appointment list for a 1:30 p.m. meeting.

McCormack later expressed surprise at the intensity of Teague's reaction, noting that he had made no pretense of representing anyone but himself. Teague was furious that McCormack saw the President without consultation with the chairman or other committee members. More news came out on the front page of the July 5 edition of *The Energy Daily*, with the headline "McCormack Finds Carter Unmoved on Breeder, Reprocessing." The article stated:

McCormack, who characterized the meeting as a "vigorous exchange", told the President that his nuclear policy would likely be reversed by Congress. * * * Carter, McCormack said, disagreed with him on several key points. The President still believes he will win in the House and Senate on these two issues and expects that the rest of the world will follow the example he has set.

Despite the fact that Teague may have agreed in substance with much of what McCormack said, he deeply resented the fact that McCormack would confide in a trade publication before he would let his own chairman in on the secret. Also, he was incensed that a committee member

would intrude on an issue which had such deep and delicate implications for legislative-executive relationships. The day after *The Energy Daily* article, July 6, Teague wrote to the President:

Numerous people have asked whether or not Congressman McCormack's letter to you concerning nuclear energy represents a committee position; the answer is emphatically "No."

The Committee voted 19 to 11 to report a bill. The Committee has been granted a rule for the bill to be considered in the House of Representatives.

As far as I can determine, Mr. McCormack consulted with no one on the Committee and as far as I know, it was strictly a personal position.

THE BROWN AMENDMENT

Following the summer and Labor Day recesses, the House of Representatives took up the ERDA authorization bill, including \$150 million for CRBR, on September 13, 1977. A major four-hour fight erupted over the Brown amendment to reduce the CRBR funding to the \$33 million phaseout level recommended by President Carter. Wydler called it "the most important energy decision that we will probably make in the next 10 years." Ottinger and Wirth argued that Dr. Edward Teller and Adm. Hyman Rickover, acknowledged nuclear experts and advocates, had their doubts about both the CRBR and the plutonium cycle, favoring the thorium cycle instead. Fuqua cited the support of the General Accounting Office for the CRBR, and he was joined by Myers, Goldwater and McCormack, then opposed by Brown, Neal and Downey. It was a good debate, because those Members taking part had boned up on their facts and arguments. Mrs. Lloyd based her argument on the expert geologists who had assessed the limited amount of uranium available. Downey dramatized his argument by holding up a soccerball-sized sphere. He demonstrated how simple it was to make a nuclear weapon if you had 10 kilograms of plutonium, "encase it with a plastic explosive which one can purchase at any good hardware store * * * and one can produce with 10 kilograms a 10-kiloton warhead." McCormack sailed a paper airplane across the floor, and claimed it was as close to a flying SST as Downey's paper soccerball was to a nuclear weapon.

NOBODY ON THE FENCE

Coughlin, a former member of the committee and long-time CRBR opponent, labeled it a "loser", and a "Ferdinand, because it may smell the roses but it will never fight our energy problem." The argument went on so long that Flowers said "I will object to my own request for additional time if I decide to make that request."

Flowers then underlined the point he was making by asking:

Would it be out of order to ask if there is any Member in the room who has not made up his mind at this point? Please raise your hand. I see no hands raised. There is one or two. That might make the difference. * * * This is not a one-sided issue. It is an issue on which there are experts for whatever point of view we want to subscribe to, for whatever point of view we find ourselves on or want to take a position on.

Harkin, a supporter of the light water nuclear reactors, stated:

I am convinced that the Clinch River breeder reactor is to our energy program what the B-1 bomber is to our defense program. I opposed the B-1 bomber, but I support our defense.

He decried the cost overruns which had hiked the bill for the CRBR up to \$2.2 billion. Glickman expressed concern at the black-and-white nature of the debate, which he said was "not becoming of our responsibilities here. A Member can be in favor of continuing nuclear power development and still be opposed to the Clinch River funding at this time."

McCormack observed:

Killing Clinch River would constitute depriving our own people of the engineering knowledge we must have for adequate supplies of energy, economic stability and jobs for our unemployed. That is why organized labor supports enthusiastically the Clinch River project.

Ottinger rebutted that the United Auto Workers and United Mine Workers opposed the CRBR. Mrs. Lloyd warned:

If construction of the Clinch River plant is canceled or delayed, time and talent will be lost.

Fish, along with Pursell the only committee Republican supporting the Brown amendment, stressed that \$500 million was in the ERDA bill for developing breeder technology other than the CRBR. Brown labeled that figure "greater in scope than the combined breeder program of all the European nations." Wydler noted:

A delay in our breeder development program would relegate the United States to enter the 21st century dependent on a 19th century fuel supply.

THE CRBR WINS A ROUND

When the vote finally came at 5 p.m. the CRBR forces defeated the Brown amendment, 246-162. An attempt by Dodd to compromise the funding at the Senate-adopted figure of \$75 million went down by the even bigger margin of 277-129. Committee members split as follows on the Brown amendment:

*For CRBR**Against CRBR*

Teague
 Fuqua
 Flowers
 Roe
 McCormack
 Milford
 Thornton
 Scheuer
 Lloyd, California
 Lloyd, Tennessee
 Krueger
 Gammage
 Gore
 Watkins
 Young
 Wydler
 Winn
 Frey
 Goldwater
 Myers
 Lujan
 Hollenbeck
 Rudd
 Dornan
 Walker
 Forsythe

Brown
 Ottinger
 Harkin
 Ambro
 Blanchard
 Wirth
 Neal
 Downey
 Walgren
 Glickman
 Beilenson
 Fish
 Pursell
 Flippo

Not voting

The September 20 vote climaxed some furious lobbying on both sides—the White House, the nuclear industry and its allies, environmentalists and internationalists. One supporter of the CRBR estimated that 75 to 100 lobbyists from the White House and various Federal agencies were on hand, opposed by an impressive array of nuclear advocates and representatives of those concerns manufacturing components for the CRBR. It was the first time in history that a President had openly and personally taken a strong stand against a nuclear measure.

WHY DID THE CRBR WIN?

Why did a majority of the Science Committee win? Some observers attributed the victory over the President to the fact that House Members had grown tired of the old Joint Committee on Atomic Energy. A majority of the House seemed to welcome the thorough fashion the Science Committee had employed through field trips and hearings to examine the issue afresh. An industry lobbyist made this statement after the battle:

A new committee got it from scratch, and when they came down solidly against the President, they had a great deal more weight with their colleagues. It brought new faces into the battle who didn't have the old label of being rubber stamps.

Having been rebuffed on loan guarantees in 1975 and 1976, a majority of the committee had a temporary glow of success in the fall of 1977. But the victory proved to be a hollow one. Congress was still disturbed about the rapidly escalating costs of the CRBR. The day after the defeat of the Brown amendment, a much narrower vote was held on a Coughlin amendment that would have gradually forced industry funding for up to 50 percent of cost over-runs for the CRBR. The Coughlin amendment only failed by 206-196.

CONFERENCE COMMITTEE WALKS ON EGGSHHELLS

When the conference committee met in 1977, it was an exercise in walking on eggshells. The conferees wanted to keep the authorization for the CRBR low enough to encourage President Carter to sign rather than veto the bill. At the same time, they wanted to write into law language which might prevent the Carter administration from interfering further with the progress of the CRBR. Realizing that every dollar the authorization was hiked above \$75 million would invite a Presidential veto, the conferees agreed on \$80 million—far below the \$150 million which had whooped through the House. Then they went to work and put in legislative language making it illegal for the Nuclear Regulatory Commission to cancel or reduce funds for the project or even move it from its proposed site near Oak Ridge, Tennessee unless the site were found to present a "radiological health and safety hazard."

In an effort to attract further administration support and try to stave off a Presidential veto, the conference committee included the language desired by the administration to allow the charging of higher prices for uranium enrichment. But the conference committee also included a provision requiring the administration to submit to Congress proposed changes in the price to be charged for enriched uranium, and gave the power to either House or Senate to veto the proposed price change within 60 days. This one-House veto provision was regarded by the administration as an invasion of the power of the Presidency.

Teague called up the conference report on October 14. Representative Morris K. Udall (Democrat of Arizona), an opponent of the CRBR, raised a point of order that since new material not considered by either House or Senate had been injected into the conference report, this new language was not germane. When the Speaker sustained the point of order, the conferees had to go back to the drawing board. They

provided an easy answer: they took the new provisions out of the proposed law, and placed them instead in the conference report language describing the statutory provisions.

LOBBYING THE WHITE HOUSE

Now the lobbying was turned once again onto the White House. Numerous issue papers were prepared to show how many programs vital to the Nation's energy needs would go down the drain if the entire ERDA authorization bill, now designed for the new Department of Energy, were to be vetoed. Fossil, nuclear, solar and geothermal programs—the heart of the energy package—would be without support if one little old section of the bill was the cause of destroying the entire \$6 billion bill.

Flowers declared:

I think we reached an extremely reasonable position, which will have strong support in both the House and the Senate.

The committee and congressional optimism proved unfounded. The President vetoed the authorization bill on November 5. He labelled the CRBR as "a large and unnecessarily expensive project, which, when completed, would be technically obsolete and economically unsound." He also cited the one-House veto on uranium enrichment pricing as one of the objections.

TEAGUE'S ANGRY REACTION TO VETO

Teague's reaction was immediate, angry and strident:

President Carter's first veto is a direct denial of his earlier claim that our energy crisis is "the moral equivalent of war." His veto reveals he does not know either his enemies or allies in that war.

The Congress recognized urgent realities when by big margins it voted to compromise with the President. His veto is unwarranted, harsh and arbitrary refusal to understand the stern realities of our Nation's and the world's energy needs, and the realities of the long and very difficult efforts by House and Senate Members to agree on an energy authorization act that went much more than halfway in meeting his demands.

We on the Hill put months of strenuous, conscientious effort into producing an effective energy research and development program which the President could wisely and to his own satisfaction sign. He was poorly advised to so ruthlessly deny our efforts.

Teague's public statement on the veto descended into putting the finger on personalities. He singled out the fact that neither Secretary Schlesinger nor any other official of the Department of Energy took part in the announcement of the veto:

Instead, his spokesmen in announcing the veto were only Stuart Eizenstat, Assistant to the President for Domestic Affairs and Ms. Kitty Shermer (sic), who I am told is a crusading environmentalist. That raises a troublesome question as to who it is that really has the President's ear in these matters. Where were his energy and science experts?

The reference to "Ms. Kitty Shermer" was a phonetic error. Teague was no doubt referring to Katherine P. Schirmer, Associate Director on the Domestic Policy Staff, and a former assistant to the late Senator Philip A. Hart (Democrat of Michigan). This conclusion misread the strong and personal convictions of President Carter on the CRBR, and may well have fostered the almost total lack of understanding dialogue between the President and Congress on the entire issue. But, as we shall see, Teague more than other committee members made strenuous and sincere efforts in 1978 to arrive at a compromise with the White House.

BROWN PRAISES VETO

Brown was pleased with the veto. He congratulated President Carter "for demonstrating the political courage and strength of his convictions." The California Congressman added:

His veto is sound on economic, political, scientific, environmental and national security grounds. It will not adversely affect our national energy situation and may well help it.

Speaker O'Neill, who tried to persuade the President not to veto the bill, predicted that it would ruffle quite a few feathers in the Congress. And Flowers, speaking of feathered creatures, commented:

We're acting like an ostrich and not an eagle if we don't go forward with the breeder.

After terming the veto as ill-advised, misguided and disappointing, Goldwater's reaction was this:

I am hopeful that the Congress will act, through overriding this veto or by other legislative action, to reverse this damaging action by the President and get our energy ship back on course. We cannot solve the energy crisis by inaction or retreat. We need decisive, positive leadership, and that is what the Congress should be prepared to offer.

Goldwater's appeal to the Congress to act may have sounded overly optimistic, particularly in light of the strong vote for the Brown amendment which made it just about impossible to override the President's veto. Yet Congress had two more parliamentary rabbits to pull out of its hat.

First, Congress quickly passed a new authorization bill which omitted the CRBR, but included almost all of the other provisions.

Congress quietly omitted the provision the White House had so badly wanted to increase the price for uranium enrichment. When the White House protested that uranium enrichment pricing as such had not been the reason for the veto, the response came back from the committee that this was part of the package.

THE CRBR GETS A SUPPLEMENTAL TRANSFUSION

While all the tumult and the shouting over the authorization bill was going on, there was slipped into an \$8 billion supplemental appropriations bill a little matter of \$80 million for the CRBR. This \$8 billion supplemental was loaded with many items which President Carter wanted, especially the final death blow to the B-1 bomber which he had been fighting very hard to accomplish. The House had taken the trouble to remove, by a vote of 252-165, a proviso which would have prohibited any expenditure of the \$80 million unless newly authorized. Then when the conference committee got around to approving the final version of that supplemental appropriations bill early in 1978, lo and behold the \$80 million was still there for CRBR and there were no authorization strings attached to prevent the money from being spent. Also, since Congress in its rebellion against "impoundments" of appropriated funds had all but outlawed that practice in 1974 law, it looked as though President Carter was stuck with \$80 million for the CRBR whether he wanted it or not. To clinch the argument, the General Accounting Office came along with an opinion indicating quite specifically that it would be illegal for President Carter not to spend the \$80 million. The GAO added the funds could not be used to curtail or terminate the CRBR, nor could they be used for some other breeder project except the CRBR.

Some of the supporters of the CRBR, who had screamed bloody murder at the interference of the GAO in presuming to offer an adverse opinion on loan guarantees, now embraced the GAO report and proclaimed that they always realized that the Comptroller General, Elmer B. Staats, was a fine, upstanding gentleman to be trusted to make a sound judgment.

As 1978 opened, the high noon shootout at Clinch River continued unabated.

The first two shots were fired by President Carter and Mrs. Lloyd. The President sent up his budget early in 1978 with only \$13.4 million for CRBR.

Mrs. Lloyd stated:

Our Committee intends to go ahead with funding for the breeder. I'm optimistic. Things are looking better and better.

When he signed the supplemental appropriations bill on March 7, 1978, President Carter noted:

I continue to believe that the construction of the CRBR is an unproductive use of our taxpayers' dollars, which will not enhance our ability to call upon the breeder to meet our energy needs. The \$80 million contained in this bill for the CRBR will be used to complete the systems design for this reactor and to terminate further CRBR activities in an orderly way.

It didn't take the GAO long to react. In hand-delivered letters to various administration officials, Comptroller General Staats warned that any Federal official certifying a voucher to use Federal funds to terminate CRBR instead of building CRBR would be held personally liable for the debt.

TO BREED OR NOT TO BREED

When Dr. James R. Schlesinger, Secretary of the Department of Energy, appeared before the committee on January 25, 1978, Wydler was the first and only Member to bring up the CRBR. Wydler asked Secretary Schlesinger this question:

The important thing was that last year when we had the argument over the Clinch River project, the argument in return was always, "Well, we're not really cutting down on research and development on the breeder reactor. We're only taking out this terrible Clinch River project, which, for one reason or another we shouldn't build. But we're going on with R. & D. and we're doing that in a substantial manner," and so forth.

Now this year we find out what's happening, that again you're trying to knock out the Clinch River project and in addition you're cutting back substantially the R. & D., which you were bragging about last year.

Now does that not really show us a trend that we're giving up on the breeder reactor?

Dr. Schlesinger responded that there was \$367 million in the budget for breeder reactor technology. He did not comment further on the CRBR. On February 2, 1978 when the Flowers subcommittee assembled, Flowers led off with this comment on that figure:

I see that even from what we considered a meager budget request last year, we're knocking off almost \$150 million.* * * Frankly, I'm appalled. I wonder where in the world the administration thinks they're going to take us, how far back. Where can we go and still be the leader in anything? * * * It occurs to me we're not going to need to worry about waste management because there ain't going to be no waste to manage; and safety might not be such a problem either, because there's not going to be enough nuclear operations going on to be too concerned about safety.

Mrs. Lloyd was biting in her remarks:

We don't have time for the floundering that is proposed in this testimony. I don't think it is going to meet our needs, and I don't think we as a country can tolerate this.

Goldwater and McCormack were also withering in their reaction. McCormack finally threw up his hands and said to the DOE witnesses defending the breeder reactor budget:

My comments are directed not to you but to the administration and to administration policies. I frankly extend my sympathies to you. I know each one of you, and I know as I sit here listening to you, that I don't believe a single one of you believes what you are being obligated to read. Many of the statements that you have been obligated to prepare and submit to us today are an insult to the intelligence of the American people, and all the world knows it. I think it's an appalling tragedy that the administration is obligating scientists to come here and make statements which they know to be nonsense, and which they know all the world knows is nonsense.

FLOWERS CALLS ON THE PRESIDENT

On February 28, Flowers met with the President, and urged him to make some kind of positive statement on behalf of his support for nuclear energy, without relation to the CRBR. They argued about the debilitating effect of the deadlock on the CRBR. Here were two southern politicians who could talk and communicate more directly than through the thick stone wall which had divided the President and McCormack when they had addressed the issue the previous July. Yet Flowers reported back that the President had fire in his eyes when he spoke of his decision to terminate the Tennessee project.

The next day the Flowers subcommittee met to mark up the DOE authorization. Mrs. Lloyd's amendment to add \$159.1 million for CRBR beyond the \$13.4 million requested by the administration passed by 17-6. Flowers termed the CRBR battleground—"a symbol between a Congress that wants resource development and an administration that is perceived to be the opposite." His subcommittee made some reductions in the Rickover-sponsored light-water breeder reactor program, and tacked on an additional \$26.1 million beyond Mrs. Lloyd's amendment to beef up the liquid metal fast breeder reactor program. The collision course was clearly set.

But wait! Suddenly a gleam of light appeared. Could this presage a desire to end the stalemate?

THE SEEDS OF COMPROMISE

There were stirrings in the White House. 1977 had been a disastrous year for President Carter's efforts to end the CRBR. The political maneuvering had resulted in an apparent victory for Congress, and yet it remained evident it could not be a long-term victory given the determination of the President on the issue. The respective staffs were in a combative, competitive mood. "We really stuck it to the White House," chortled one committee staff member with some glee. When

there is an impasse in the political process, there is always a search for accommodation. Most of the players in this high stakes game realized that something had to give or else the bloody battle would go for years more, with everybody the loser.

President Carter gave Secretary Schlesinger authority to try and negotiate a compromise with Teague. Following several lengthy discussions, the Secretary proposed a letter to Teague outlining a suggested compromise. Teague refused to consider the suggested letter because it opened with the blunt statement that CRBR would be terminated. This was the major hangup which stymied the negotiations on repeated occasions. Teague insisted over and over again that the CRBR was not going to be killed, and he refused to allow any phrases in the law which so stated. Furthermore, he repeatedly refused to allow language which deauthorized the CRBR, which had been initially authorized by law in 1970. The President and Secretary Schlesinger faced a dilemma: how do you end a project without coming right out and stating that fact? To win Teague's support, some way had to be found to escape the horns of that dilemma. Before the fight was over, many tufts of hair were scratched out trying to resolve that one. Teague was insistent that he could never get a compromise through Congress if the CRBR were killed outright.

On the night of March 13, 1978, Secretary Schlesinger went to Capitol Hill and met with Teague and several senior committee members. Teague told the committee the next day:

There are a number of things going on downtown in the executive branch of the Government. We met here last night until about 9 o'clock with Dr. Schlesinger, and they are proposing some things that I am not able to comment on.

Teague told his committee that "what Dr. Schlesinger is proposing requires some considerable liaison work and consultation, hundreds of questions of different people and suggested amendments and what-not."

The spirit of compromise was in the air. As presented by Secretary Schlesinger, the White House proposed that to replace the CRBR the administration would study and design a more modern breeder reactor, utilizing six years of work on CRBR as well as much of the equipment as possible. In a series of meetings in Teague's office and elsewhere, the compromise was examined carefully. It did not satisfy the pronuclear forces because it stopped short of making an absolute commitment to build a new breeder reactor; the administration would only go as far as to promise to study plans for such a reactor. Strenuous efforts were made on both sides to work out a compromise which



Three of the principals in the CRBR fight. From left, Representative Olin E. Teague (Democrat of Texas), Walter Flowers (Democrat of Alabama) and Mike McCormack (Democrat of Washington).

might attract enough support among the widely divergent points of view in the Congress.

Teague's meetings included Flowers, McCormack, Fuqua, Wydler, Brown, Mrs. Lloyd, committee staff, on one occasion Senate energy committee staff, and GAO representatives. Sometimes they met in Teague's office, sometimes in the committee rooms. Pots of coffee percolated nonstop. There were other liquids also.

At the close of the March 14 full committee meeting, Teague lifted the corner of the tent a bit more:

We may have to wait a little while on this new thinking down at the administration, but there is something going on proposing a different use within the nuclear field that would have a big impact on our markup. A lot of people have talked about it and a lot of people disagree. I just cannot give you any real definite and definitive information on what it is all about.

Watkins then asked in an innocent tone: "Have they changed their mind on Clinch River?" When the laughter had died down, Teague responded:

I will give you one guess as to what this pertains to and if you miss that you flunk the course.

THE NEGOTIATIONS INTENSIFY

On the night of March 14, the negotiations became more intensive. Teague reported at the full committee meeting on Wednesday, March 15:

I would like to tell the committee that there is a real attempt being made to come to some consensus on nuclear between the Senate, the House, the White House, DOE, General Accounting Office, and we hope that by next Tuesday morning, there will be something definite.

Events moved swiftly later that week. Teague, Flowers, and Schlesinger were very eager to end the senseless deadlock, and they bent every effort to arrive at a compromise which would fly in Congress and attract a majority from the political center of the nuclear controversy.

On Thursday, March 16, Mrs. Lloyd, accompanied by Congressman Duncan and the two Tennessee Senators met with President Carter. According to Mrs. Lloyd:

The President told me: "Marilyn, I am opposed to the CRBR program as it now stands." He did say that he wanted to put this on the back burner until he could go down and really see what we were doing. * * * I didn't try to change his mind. But I said: "I think that we can accommodate your fears and your concerns and satisfy our commitment with going ahead and developing a breeder technology to test alternate fuels. I think we can do both, Mr. President."

PRESIDENT PROMISES TO VISIT OAK RIDGE

The President's promise to visit Oak Ridge seemed like an effort, in the eyes of some of the strongly pronuclear advocates on the committee, to be part of a further strategy of delay. They wanted to get on with the job of forcing the issue on the CRBR. A minority of environmentalists on the committee continued to be appalled at the strong arm tactics being utilized to force the President's hand. Teague and Flowers remained determined to seize the middle ground and exploit statesman-like compromise in the interests of getting the issue off the dime.

Perceiving that he could not win over the hardliners, Schlesinger finally unveiled his proposal in a letter to Teague dated March 17, 1978. The letter included these recommendations:

To pursue our conversation of earlier this week, this letter further elaborates on a proposal to redirect the Nation's breeder program. This new direction, which would accompany a CRBR program calling for completion of systems design and component testing only, would in our view strengthen our breeder R. & D. program. * * *

The March 17 letter proposed evaluating designs for a larger breeder facility, spending \$55 million, utilizing 90 percent of the CRBR team of 859 professional persons and keeping the CRBR technology team

together. "This approach would allow the country to build in an orderly way upon the six years of work on the CRBR," Schlesinger wrote.

Between Friday the 17th and the following Tuesday, when the full committee was scheduled to meet, there was frantic lobbying, more conferences and almost nonstop negotiations going on to try and line up the terms of the compromise. Teague authorized Flowers to draft an amendment for the March 21 full committee meeting, representing as closely as possible the proposals in the March 17 letter. The chairman insisted that the basic authorization for the CRBR, going back to the 1970 law, must not be terminated because that represented the keystone to House majority support for a strong breeder reactor program. In a further effort to attract support from nuclear advocates, Schlesinger also endorsed legislation to speed up the licensing of new nuclear plants. This move sparked an angry reaction from the Natural Resources Defense Council, an environmental group, which said it "represents the final corruption of the President's moral and political courage on the nuclear issue."

On the night before the full committee meeting, another tension-laden meeting was held on Capitol Hill in an attempt to hammer out the final details on the compromise amendment to be offered March 21.

"THE PRESIDENT IS CALLING"

Late on the evening of March 20, the President telephoned Teague from Georgia. As Teague told his committee the next day:

The President in no way, form or fashion committed himself to Clinch River. But he completely and absolutely committed himself to breeder technology, and he committed himself to the letter you have in front of you that came from Dr. Schlesinger. (The March 17 letter.)

Flowers described the compromise to the committee in some detail. He noted that DOE over a period of 2½ years would study the design of a new breeder demonstration project in the 650-to-900 megawatt range, from two to three times the size of the CRBR. Flowers described it as "a viable accommodation which we hope will get us off dead center on breeder technology."

Wydler was reasonably supportive at the start:

About a week ago, the Secretary of Energy came to us and had a proposition, in effect, offering us various things the administration was willing to do which enhanced the development of atomic energy in our Nation, asking us in effect to get away from this confrontation on the Clinch River Breeder Reactor Project.

We really felt that the initial proposals were vague, and we spent most of the last week trying to get some hard information on what was really being proposed.

We finally culminated that last night with a meeting in which some hard proposals were made. * * * I'm willing to talk business with the President and try to come up with some policy that will get us back on the road to taking dominance in this breeder field.

But Wydler did ask for some extra time to insure that all committee members had their questions on the proposal thoroughly reviewed and answered by top DOE officials like Schlesinger and his deputy, Dale Myers. Teague responded that he wasn't trying to "cram something down anybody's throat." He added:

This amendment is about all I worked on for the last week and I think I've talked to everybody and his grandfather about the thing.

Flowers pointed out that other concessions had been made by DOE and the administration:

I have been deeply concerned from the very outset, about a year ago, when we got into the first Carter Administration budget in this committee, about the lack of enthusiasm for the nuclear side of it. * * * I think we are at the threshold of seeing a very dramatic turnaround on that.

Winn was skeptical. He said that it was pretty obvious that the administration had its back to the wall as a result of the coal strike, and that he wanted to see more in writing from the President on what he said he would do with nuclear energy.

Mrs. Lloyd raised a number of questions needing clarification such as the reference to 859 professional people working on the CRBR, which she said conflicted with the GAO figure of 1,737. She remarked:

I don't think we have anything except a study. And I think our country needs more than a study.

Lujan and Goldwater were also critical. In trying to placate them, Teague remarked that Dale Myers was available to answer questions, prompting the following colloquy:

Mr. GOLDWATER. Mr. Chairman, I've got about 30 pages of questions here that I put together.

Chairman TEAGUE. How many?

Mr. GOLDWATER. About 30.

Chairman TEAGUE. Well, I would suggest you spend the night with Mr. Myers.

FUQUA URGES COMPROMISE

Fuqua urged some early action toward a compromise:

This Member has supported the Clinch River in the past. But the President has made that determination, and we're in a situation in the House and I think in the Senate where we have a majority vote but we don't have a two-thirds vote to override the veto. * * * We are in a deadlock. We can go up and down the hill again, like we did on the B-1 and some other issues, if we want to continue to do that. But the President has made the decision, and we can't force him to build Clinch River if he decides not to do it.

But after listening to the discussion for awhile, McCormack leveled a strong broadside against the Flowers compromise:

I do not consider what we have before us in the Flowers amendment as a compromise. It is at least 99 percent of the administration position. And what we are essentially doing is what Mrs. Lloyd just said that we should not be doing in this, and that is simply giving up, allowing Clinch River to be killed, in exchange for a study.

McCormack stated that "we should ask for a good deal more." His suggestion was that the committee should authorize a new project to be called the Oak Ridge Breeder Experimental Test Reactor.

The battle lines were drawn.

Teague arranged for Dale Myers to meet with and answer questions from committee members on the afternoon of March 21 until after 6 p.m. Goldwater and Mrs. Lloyd were especially disturbed that specific information was not available on the costs of legal entanglements which would result from the cancellation of utility contracts on the CRBR. Flowers convened additional hearings of his subcommittee on March 22 and April 4, to which he invited all full committee members also. The April 4 hearing featured sharply critical comments on the compromise by representatives of the utility industry. The President of the Duke Power Co., B. B. Parker, speaking on behalf of the Edison Electric Institute (the trade association of electric utilities) branded the Flowers compromise as totally unacceptable. He also noted that the March 17 letter from Secretary Schlesinger to Teague had been drafted without notice to or consultation with the project participants. As a matter of fact, several people had their noses out of joint because they weren't involved in the late-evening negotiations in Teague's office and in the Science Committee rooms. Myers, ranking Republican on the Flowers subcommittee, resented his not being invited, so did the dozen almost-forgotten band of Democrats, plus Republicans Fish and Pursell, who had throughout opposed the CRBR and supported President Carter's stand.

CONGRESSIONAL CRITICS OF THE CRBR

Suspicious of the terms of the compromise negotiated by Teague and Flowers, the opponents of the CRBR and supporters of President Carter's early position wrote him on April 7:

We are concerned that the compromise moves us substantially ahead with the breeder program before a comparable program for developing alternative energy resources is in place.

We are not convinced that the compromise is necessary to terminate the Clinch River breeder reactor. We are concerned that the compromise may signal a series of actions by the administration that will result in an earlier commercialization of the breeder than if we did nothing at this time.

On April 10, Ottinger, Wirth, Harkin, Brown, Glickman, Downey, and Fish met with the President. The President emphasized to them that the compromise represented only a design study, with no commitment to a breeder program in 1978; that the Carter administration would step up funding of alternative energy programs such as solar, geothermal, and conservation; and that solar power would figure strongly in the new national energy plan. Secretary Schlesinger sat in with the group in their meeting with the President, and they came away pleased with the President's response.

A FATEFUL MEETING WITH UTILITY REPRESENTATIVES

Tiger Teague always operated on faith. He had an ingrained feeling that if you always levelled with all people, they would level with you. He preferred gin rummy to poker, which may or may not have been symbolic. He knew there was bitter opposition in the nuclear industry to President Carter's position on the CRBR, and the giant utilities had tremendous power in congressional districts throughout the country. He appreciated the sources of political and economic power, and knew that if he could soften the opposition of the nuclear industry there might be a chance to succeed.

The major utilities represented in the nuclear empire were easy to contact—they all had their Washington headquarters. There wasn't time to call in the presidents and chairmen of the boards, and the Washington representatives knew their way around. Furthermore, they were the ones who were sending out the signals to committee members on how their companies felt about the efforts to compromise on the CRBR—a very hot issue which had already been aired fully in the press. The pressure was intense. These Washington representatives had entree to many congressional offices. The signals could be changed quickly if necessary. By early April, every nuclear industry signal was red on the Flowers amendment.

Teague decided it was time for a bold move. He phoned about 20 of the Washington representatives and asked them to meet in his office on Monday evening, April 10. Surprisingly, nobody had a previous engagement. The turnout was 100 percent.

In keeping with his policy of being completely open and frank with the industry representatives—a policy he had successfully followed with the aerospace industry ever since the early days of NASA—Teague distributed copies of the proposed Flowers amendment which was to be brought up in the full committee session the following day. This immediately set off an argument concerning phraseology in the

amendment. One of the industry representatives said that there was language in the Flowers amendment which deauthorized and thereby killed the CRBR.

TO TERMINATE OR NOT TO TERMINATE

"Where is it? Show it to me," Teague demanded. When the industry representative read the deauthorizing clause, Teague very honestly stated that he did not know such a clause was in the amendment. Teague immediately turned to the Flowers subcommittee staff director, Rob Ketcham, to find out why the offending section was in there. Ketcham explained that the General Accounting Office had based the continuance of the CRBR on the basic authorization legislation in the 91st Congress, and advised that tinkering with that legislation might jeopardize the continuance of the CRBR, given the strong opposition of the Carter administration. Teague forthwith insisted that the deauthorization clause be taken out of the Flowers amendment, so that no opponent could claim the CRBR was being killed. The phrase was then changed to read:

With respect to the Clinch River Breeder Reactor Project, the Secretary of Energy is authorized and directed only to complete systems design and to complete and test such selected components as are necessary and appropriate for the purposes of (the conceptual design study and the LMFBR Base Technology Program.)

Ketcham subsequently described the situation this way:

Since I'm a Boy Scout, I feel that if you are going to change something, you should do it with a clean, sharp knife.

The nuclear representatives were of course impressed with Teague's open attitude and his desire to try and make sure that nobody would draw the conclusion that the CRBR was being "terminated." The word itself provided a semantic hangup among all parties concerned. But Teague's action at the meeting did not mollify the utilities. And Teague, in 1979, in reflecting back on his strategy, conceded that he should not have laid all his cards on the table:

I wish now I had kept my damned mouth shut last year and not told all those utilities about it. We would have passed it. I called 20 of them in, gave them the amendment, told them all about it and they worked like ants that night and the next day.

SLUGGING THE REFEREE

The committee met on the morning of April 11 to take up Flowers' suggested compromise. The events of the following week were the

most bitter and divisive in the history of the committee. At the outset of the April 11 session, Flowers confessed:

I have to say that I have been dealing with the opposing forces on this issue, and I feel somewhat like the referee or the umpire when both sides turn on you and start slugging you.

The slugging started almost immediately. McCormack branded the compromise as having the effect "to kill the Clinch River Breeder Reactor Project and to substitute for it a rather vague study which would come back to us in 1981 after the next presidential election." Flowers shot back:

That is editorializing, Mike. That is not what my amendment is aimed at doing.

McCormack punched again:

The President has repeatedly stated that he intends to try to destroy the program, but I think we cannot, as representatives of the people of this country, be frightened by this threat.

Mrs. Lloyd added:

There is no other way I can read this except this is the death of the CRBR program.

Brown warned against forcing the President to the mat once again in "a confrontation which apparently a substantial number of members of this committee are seeking to encourage and perhaps hope to see happen." He urged support for the Flowers amendment, which he said would "move us forward into a constructive nuclear program and to avoid this bickering over something which we really feel—regardless of what we do in this committee—is dead and we might as well bury it and go on with the work that needs to be done." Jim Lloyd added:

We cannot stand around fighting over a Clinch River Breeder Reactor. The President ain't gonna buy it. So let's accept that and go forward with other programs which will allow us to participate in the energy program in the nuclear field as rapidly as possible.

Lujan disagreed:

The American public feels that we are headed in the wrong direction and that someone has to take the bull by the horns and direct it in the proper direction * * * and keep us away from floundering.



Representative Robert A. Roe (Democrat of New Jersey), second-ranking member of the committee in 1979.



Representative Edwin B. Forsythe (Republican of New Jersey), who joined the committee in 1977.

ROE MOVES TO TABLE

There followed a series of incredibly close votes and a nasty parliamentary tangle. Roe's motion to table Flowers' amendment carried by 20-18. Seven proxies were used.

At the start of the April 11 session, Teague observed:

There are a number of people who have proxies, including myself. Those proxies must comply with the rules of the committee to be used.

Immediately after the success of the motion to table, the meeting was adjourned to enable Teague to verify the validity of the proxies with the House Parliamentarian. This having been done, there followed some more complex parliamentary maneuvers when the committee assembled on April 12. Mrs. Lloyd's amendment to the Flowers compromise was defeated on a narrow 18-15 vote, because Wydler was temporarily absent at a meeting of the House Government Operations Committee and held five proxies which could not be delivered on time. Now McCormack stepped forward with what he termed his "Orbeter" amendment to authorize \$48 million for building the Oak Ridge

Breeder Experimental Test Reactor. Regarding his proposed facility, McCormack explained:

It would be larger than Clinch River. This is one of the points that the administration has been making and probably large enough to make the appropriate engineering decisions necessary to go commercial when we need to, by 1990. * * *

The second paragraph of the amendment says that if the first paragraph is adopted then we go ahead and phase out Clinch River and we abandon it and close it out.

Flowers responded:

I rise in strong opposition to the gentleman's amendment. I am a little astounded that he is offering it. * * * I don't think there is anybody in industry or utilities or government in favor of building another Fast Flux Test Facility just to make sure that they have something at Oak Ridge, Tennessee.

MRS. LLOYD'S AMENDMENT PREVAILS

The McCormack amendment passed by the narrowest of margins, 20-19. It seemed evident to many members at this point that some of the 19 votes were being cast out of personal loyalty to Chairman Teague, rather than genuine desire to give up on the CRBR. Some of these 19 frankly favored the chance to vote for Mrs. Lloyd's original amendment which had lost only because of Wydler's absence from the committee room. So there was a move to reconsider the vote on Mrs. Lloyd's amendment, which then carried by 25-14. To the \$172.5 million in her amendment for continuing the CRBR, Mrs. Lloyd had also added \$35 million for a nuclear breeder study like the one called for under the Flowers compromise.

The debate—raucous, bitter and fraught with many exaggerations—was not without its occasional humor. When Flowers noted that both the environmentalists and nuclear advocates opposed his amendment, Teague asked:

Which environmentalists on the committee are against the amendment? I was informed the environmentalists on this committee will vote for it.

McCormack boomed:

Mr. Chairman, I am an environmentalist. I consider myself to be as much an environmentalist as anyone, and I oppose the Flowers amendment.

Teague rather drily observed:

I think there are some members of this committee who would not consider you an environmentalist.

This caused McCormack to charge into action:

Mr. Chairman, I will not take second place to anyone in my support for environmental protection. That's what the breeder program is all about—providing the most environmentally acceptable, safe, clean, cheap energy. I am not going to stand by

and allow any self-serving individual or self-serving group to pin some "holier than thou" label upon themselves, such as "environmentalist" and then assume the right to tell the rest of us that they have some special privilege to determine what is best for the environment, and that those with whom they disagree are not interested in environmental protection.

ARRANGING A MEETING WITH THE PRESIDENT

Despite the adverse vote in the committee, Teague decided that the only course of action was to press forward with the Flowers compromise. It was evident that one of the biggest power blocs opposing the Flowers compromise was the nuclear industry. Teague reasoned that if he could persuade both President Carter and the top officials of the nuclear industry to sit down around the cabinet table in a summit meeting, there might be a chance to come closer toward a mutual understanding and perhaps break the deadlock. Teague's initiative was expressed in a May 10 letter to over a dozen executives, the bosses of the Washington representatives with whom he had been dealing. He wrote:

There is an imperative need for you, and for the principal officers of other major firms interested in the future of nuclear energy to recognize the hard realities of the present deadlock here in Washington concerning development of breeder reactors.

That deadlock must be broken constructively before there can be any hope of further progress in developing a vigorous U.S. breeder program.

Teague stated that unless a positive compromise could be negotiated, along with strong support, "another whole year or more will be wasted without decisive action toward the actual construction and demonstration of a breeder reactor." He also said that he was convinced the best way to obtain an agreement was to arrange a face-to-face discussion with President Carter and Secretary Schlesinger. Teague told the executives that he was "glad to act as a catalytic agent in attempting to arrange such a conference at the earliest feasible date." He asked each executive to telephone, and received a favorable response.

On May 22, President Carter visited Oak Ridge, but if either supporters or opponents of CRBR expected any word of advice from him they were disappointed. He skirted the issue completely. Wydler called it "a nontrip." The only remote mention of the issue was a sign outside the auditorium where the President spoke, which read:

Get off your tractor
Start the reactor

MOVING OFF DEAD CENTER

A few days after the President returned from Oak Ridge, Teague wrote him a lengthy letter reviewing the developments of 1978 and

outlining his formula for breaking the stalemate. As a result of the committee vote, Teague was pessimistic and bluntly told the President:

It seems evident that this committee action will be confirmed when the issue comes to the House floor.

He acknowledged that the President would certainly veto the bill if it came to his desk in the form in which it emerged from the committee, with the increased funds for CRBR. Also, it was no secret that Congress could not muster the necessary two-thirds vote to override the veto, producing another stalemate. "We will wind up this year on dead center," Teague accurately predicted.

"I hope you agree that any such nonproductive deadlock will be a severe blow to our national interest, as well as the world's best interest," Teague told the President. He then made this suggestion:

Mr. President, very respectfully I suggest there now exists an immediate, imperative need and opportunity for you to confer personally with the principal executive officers (as distinguished from their Washington representatives) of several of the key industry and utility firms involved in the breeder reactor technology and at the same time with several of the key Members of Congress who are attempting to get agreement for a workable breeder program acceptable to you.

This is my urgent, personal request for such a useful discussion with you. Frankly with all respect, I must tell you that industry and congressional leaders seem reluctant to believe my report to them that you do favor a strong breeder program.

THE SPLIT AMONG THREE CAMPS

Teague described the three groups and how they felt about the Flowers compromise amendment: (1) those who believed the President really supported a vigorous, viable breeder technology development; (2) those who opposed any breeder development and who interpreted the President's proposed "intensified studies and design efforts" as really meaning an intention to kill any significant breeder effort; and (3) a majority of the committee who also refused to believe the proposed study was intended to produce any positive results. Teague noted that the first two groups supported the Flowers amendment, but the third group was lined up against a compromise.

Because of "this intense uncertainty" which had produced the impasse, and "this refusal of most Members of Congress and also of industry leaders to believe the assurances that you personally gave to me," Teague concluded to the President:

So, I am convinced they must learn that directly in at least a brief personal conversation with you. I am confident that such a face-to-face exchange could result in an immense benefit to the Nation, to our energy alternatives program and to your own creative record as President.

Teague indicated that he had sounded out industry leaders and found them receptive to his suggestion. He told the President that the important ingredient needed was some form of personal confirmation that the

"intensified studies" mentioned in Secretary Schlesinger's March 17 letter were "not an end in themselves but definitely intended to produce an effective breeder program, including those safety factors to which you are dedicated." Teague added:

I am confident you will understand the current skepticism of expensive "studies" unless there is a firm intention to harvest positive, creative results. There also is, as you will understand, an anxiety that the many valuable products thus far obtained from the CRBR effort shall not be wasted but used in every way possible in the redirected breeder program.

Teague told the President his letter was his own idea, did not represent any official position taken by the committee, and that the only person he had conferred with concerning the letter was Flowers. He even suggested a tentative date when some industry executives could come to Washington—June 14.

THE SUMMIT MEETING ON JUNE 14

The President not only embraced the idea, but he also agreed to the specific date, and the meeting was held June 14. The following nuclear industry and utility executives met for nearly an hour with the President:

Willard J. (Al) Rockwell, Jr., chairman of the board, Rockwell International Corp.
Walter D. Dance, vice chairman of the board, General Electric Co.
R. E. Kirby, chairman and chief executive officer, Westinghouse Electric Corp.
Arthur J. Santry, Jr., president, Combustion Engineering, Inc.
Kenneth A. Roe, chairman and president, Burns & Roe, Inc.
W. F. Allen, Jr., president, Stone & Webster Engineering Corp.
Harry Orville Reinsch, President, Bechtel Power Corp.
George G. Zipf, chairman and president, Babcock & Wilcox Co.
William S. Lee, president, Duke Power Co.
William McCollam, president, Edison Electric Institute.
William G. Kuhns, chairman of the board, General Public Utilities.
Sherwood H. Smith, Jr., president, Carolina Power & Light Co.
James J. O'Connor, president, Commonwealth Edison Co.

Brown and Flowers also attended the White House meeting, along with Secretary Schlesinger. The President told the group initially that he would veto any CRBR construction bill, but was eager to hear their views. He also indicated that the CRBR was not feasible from the standpoint of limited funds available, and appeared to stress this point more than the nuclear weapons proliferation argument, according to his listeners. Teague followed up his initiative with letters on June 15 and June 30 to each of the participants, asking them to write their reactions to the meeting, and to define whether there was any hope of reaching "some sort of positive consensus." The participants responded, complimenting Teague for his leadership, stating that it was worthwhile to learn the President's views first hand instead of trying to read

between the lines of written statements. But nobody budged or blinked. The lines of battle were still drawn rigidly. The President of Commonwealth Edison Co. summed it up when he wrote Teague on July 5:

The Flowers amendment is well-intentioned, but as you note, it contains no commitment to build a breeder.

The CRBR supporters enjoyed active and powerful organizational support from the nuclear industry and segments of organized labor, especially the building and construction trades. Mrs. Lloyd, McCormack, Wydler, and their allies were not idle in the three-month period between committee passage of Mrs. Lloyd's amendment and the floor debate in the House. While the messy jurisdictional controversy with the Commerce Committee was proceeding (see pages 720-721), the CRBR supporters were bombarding their House colleagues with "breeder briefs" and other factual material to arm them for the coming struggle. Wydler and Myers wrote five "Dear Colleague" letters to fellow Congressmen in the days before the vote. Throughout the Nation, employees of those companies producing components for CRBR entered the fray with a flurry of mail to bolster additional support in Congress. The opponents of CRBR were likewise active, and they too circulated large numbers of arguments to bolster their case.

JULY 14—DAY OF DECISION

The day of decision finally arrived on July 14, 1978. A final appeal had been made in a "Dear Colleague" letter by Teague, Fuqua, Flowers, and Brown to support the compromise. But every House Member was also peppered with equally persuasive arguments on the other side.

In presenting his amendment to the House, Flowers recognized that few minds would be changed by the debate:

All of the arguments that I am going to hear shortly against it I have made myself in years gone by. I think I can anticipate each and every one of them.

"This is a true compromise in that it does not completely satisfy either side of the ideological fight," declared Brown.

Wydler fired back:

Let nobody make any mistake about what he is doing when he votes for the Flowers amendment. The Flowers amendment finishes, puts to death, the Clinch River project. That is the exact result of it. * * * The Clinch River project is dead as a doornail once that amendment is passed.

McCormack said the House would be in a stronger position in the conference committee if it rejected the Flowers amendment:

Then, we are in the position to tell the President that we can force him to veto it if that is what he intends to do, and tell the American people that he intends to kill the breeder program. Let him be the executioner, not us.

Lloyd of California, a past supporter of the CRBR, told the House:

We can talk about it until we are blue in the face, but we are not going to accomplish anything.

Mrs. Lloyd pointed out that "No one in the nuclear industry or in the utilities industry" supported the Flowers amendment. She added:

Clearly the breeder is not dead. But this amendment would bury it alive.

"I do want to try to get something done. I do not want to just sit and spin wheels," urged Teague. Fuqua pointed to the \$375 million in the DOE authorization bill as representing a "major commitment by the administration to the nuclear breeder." In arguing for the Flowers amendment, Harkin tried to persuade his colleagues they "should not get tied to some symbol, some old worn-out symbol that is going to bog us down and cost the taxpayers money and which may in the long run do more harm to our overall energy efforts in the future than anything else." But Goldwater and Myers insisted that to vote for the Flowers amendment was a vote to kill CRBR and "abrogate our leadership."

When the roll was called, the Flowers amendment was defeated by 187-142, a narrower margin than the CRBR vote in 1977, but a disappointing loss for those who had worked long and hard for a compromise. The committee split evenly as follows on the July 14 vote, with 18 votes on each side:

For Flowers compromise

Teague
Fuqua
Flowers
Brown
Milford
Ottinger
Harkin
Lloyd, Calif.
Ambro
Blanchard
Wirth
Neal
Downey
Flippo
Glickman
Beilenson
Fish
Pursell

Against Flowers compromise

Roe
McCormack
Thornton
Scheuer
Lloyd, Tenn.
Gammage
Gore
Watkins
Young
Wydler
Goldwater
Myers
Lujan
Hollenbeck
Rudd
Dornan
Walker
Forsythe

Not voting

Frey
Krueger
Walgren
Winn

Three days later, on July 17, still another vote occurred on the CRBR. When the DOE authorization bill was up for final passage, Fish, one of the two Republican opponents of the CRBR, offered a motion to recommit the bill with the Flowers compromise included in his motion. In arguing for his motion, Fish remarked there had been over 100 absentees when the July 14 vote was taken. He added:

(If) we are to have a bill, then this compromise is an essential part of it. I happen to have several things that I want very dearly in this measure and I would hate to see it vetoed.

Following a somewhat repetitious debate, the Fish motion lost by a 157-238 vote.

THE STORIES ABOUT A "DEAL"

The ill-fated issue received some additionally bad publicity later in the summer. There were news reports of a "deal" between Senator James A. McClure (Republican of Idaho) and the President, concerning the allegation that Senator McClure might support the President's position on an energy bill and possible discontinuance of CRBR in return for a larger breeder reactor in Idaho. Several versions of these rumors surfaced, making it difficult to sort out the truth. But the news stories themselves did not make it any easier to come to a resolution of the issue. The costs of the CRBR mounted as the Federal Government continued to pay for newly manufactured components which were stored away waiting for an uncertain future. Meanwhile, not a spade of earth had been turned nor were any steps taken to clear the construction site along the Clinch River.

The Senate did not even take up the DOE authorization bill in 1978. Thus, the authorization died at the close of the 95th Congress, but sufficient funds were appropriated to continue the purchase of components. In its budget submitted in 1979, the Carter administration omitted funding to continue CRBR, again asking for \$55 million for a conceptual design study of a bigger, advanced breeder plant. The total budget request for liquid metal fast breeder development was \$504 million. In an April 24, 1979 letter to Speaker O'Neill, President Carter stated:

Since the beginning of my Administration, I have opposed construction of the Clinch River Breeder Reactor. In recent days, I have again reviewed this matter and I remain convinced that completion of this project would not be in the national interest.* * * I want to emphasize that my opposition to CRBR does not imply opposition to breeder reactors in general or to nuclear power.

The President correctly labelled the CRBR controversy "prolonged and divisive." He asked for enactment by June 1 of legislation which would obtain the maximum benefit from past CRBR investments, move

forward on the conceptual design study and the \$504 million LMFBR program.

The McCormack subcommittee, in 1979, voted \$183.8 million for CRBR, stipulating the funds had to be used for continued procurement of prototype and plant components, detailed engineering design of the plant and ongoing development activity. The conceptual design study for a bigger, more advanced breeder plant was slashed from \$55 million to \$15 million, on the grounds the higher figure would divert engineering design teams from their work on the CRBR. The stage was set for another shootout in the full committee, which occurred on April 26, 1979.

THE 1979 FIGHT OVER THE CRBR

Brown made the first move by introducing an amendment patterned generally along the lines of the administration proposal, but preserving the amounts the McCormack subcommittee had voted for various nuclear programs. He explained that the administration proposal had realigned the funding of other nuclear construction projects:

I was told, and I do not vouch for this, that this reflected an agreement made by the President with Senators McClure and Church last year and dealt with some projects in Idaho and possibly some in Washington. I have not chosen to include that section because first I didn't necessarily agree with all the changes, and preferred to remain with the figures that the subcommittee had reached in their deliberations.

Brown's amendment repealed the 1970 law authorizing the CRBR. Wydler's point of order that the repealer went beyond the scope of committee authority, by amending permanent law, was sustained by Chairman Fuqua. Brown then revised his amendment to read "notwithstanding" the basic law, and survived another point of order.

Fuqua attached an important proviso to the Brown amendment, directing DOE to initiate site selection and licensing activities for the new, larger breeder reactor. Brown later explained:

While the amendment by Chairman Fuqua was not part of the President's compromise package, I supported it in the hopes that the Members who wanted to vote in support of the breeder reactors and who generally wanted to end this futile struggle over the CRBR would feel more assured with this additional language.

Representative Marilyn Lloyd Bouquard argued against the amendment, on the grounds the CRBR was badly needed, was not obsolete "and it is in fact the most advanced breeder facility prototype that we do have." Wydler and Goldwater spoke strongly against the Fuqua proposal, with Goldwater noting:

The way to solve the impasse is to go ahead and build this breeder at Clinch River, and then begin discussion at the same time of a larger, more sophisticated, more advanced technical concept. I think until we have that kind of commitment, I find it very difficult to support this amendment.

Now arose opposition to the amendment from an unexpected source, freshman Democrat Howard Wolpe of Michigan. Wolpe mentioned the events at Three Mile Island which "focused attention on the public health hazards of nuclear technology." He raised the question whether so much reliance should be placed on nuclear power rather than producing fuels for transportation and space heating.

Roe made a lengthy, rambling argument against the amendment, gloomily predicting that "the breeder reactor program for the Nation will be stopped and then we will go into a long drawn-out term of looking, reviewing, what should we do next, Marty, what should we do now, Marty." Wandering up and down the scale, with bursts of eloquence out of which it was difficult to squeeze much substance, Roe gave his best summary in saying:

We are all over the lot and I suppose I am just as guilty as everybody else around here as to definitive policy.

There ensued this short, sharp exchange:

Mr. AMBRO. I really must say at the outset that I feel like the dog act following the stripper.

Mr. ROE. That is the nicest compliment that has ever been made to me.

Mr. AMBRO. I have some more for you, Mr. Roe. * * * I think our salvation is nuclear. However, I do think that the Clinch River breeder reactor is the worst ripoff that the American taxpayer can undergo. * * * I think this attempt by the gentleman from California and the Chairman to utilize the technology that we have ongoing, and develop a bigger and better breeder reactor is a good effort, not to kill the fission program, but to move us in a direction which eliminates a good deal of the problems that are on the minds of the American people.

THE 1979 COMPROMISE FAILS

The Fuqua amendment went down by 24-16, and the Brown amendment lost by 25-15. The committee in its report included strong words of support for the CRBR:

It is critically important that this country retain a commitment to build a breeder reactor technology demonstration plant. In the absence of any firm decision to build a large plant upon the completion of the newly authorized conceptual design study, the committee has acted to preserve the integrity of the Clinch River Breeder Reactor Project. * * * We cannot expect other developed nations to take us seriously in matters of nuclear technology or safeguards if we do not make a visible national commitment to build a plant and obtain operating experience.

In separate views, Representative Marilyn Lloyd Bouquard challenged DOE's assessment of uranium reserve supplies, and DOE's planning for future production capacity of uranium. She related these points to the need for the CRBR, indicating that DOE was assuming the long-term uranium supply was greater.

Brown and Harkin both wrote additional and dissenting views on the CRBR. Harkin said:

Forget about the symbol of Clinch River; and let us work at really moving ahead with the new ideas and the design concepts that we have with breeder technology. * * * We are not just keeping (the CRBR) alive; we are reviving something that, for all intents and purposes is dead anyway.

Brown asked:

Why is there such a struggle over the Clinch River Breeder Reactor Project? I'm convinced that it is a matter of political overkill, where the nuclear power industry and the supporters of this single public works project are using the CRBR as a symbolic test of strength and a simple effort to keep the money flowing.

In a joint letter to President Carter on March 27, 1979, McCormack and Wydler suggested that the CRBR might beneficially be terminated "provided that the administration and the Congress are committed publicly and in the law, to support construction of an advanced LMFBR during the coming decade." The proposal was not accepted. On the House floor, Fuqua and Brown attempted to overturn the majority action of the committee on July 26, 1979, but their compromise efforts were defeated by a margin 10 votes greater than in 1978, as the committee view prevailed, 237-182.

And so the struggle went on and on. Was it, as Representative Brown put it, "merely a pork-barrel public works project?" Or was it, according to Representative Bouquard, "equivalent to all the minable coal in the United States and all of the oil reserves in the world?" The peacemakers were badly outnumbered by the polarizers. Although President Carter assembled the principal leaders for a summit meeting at the White House once again in the spring of 1979, he had far more success with President Sadat and Prime Minister Begin.

NUCLEAR RESEARCH AND OVERSIGHT

When the Science Committee took over some of the work of the Joint Committee on Atomic Energy in 1977, there was a chaotic situation. The Joint Committee had rarely been questioned or challenged since the days it had firmly established civilian control over nuclear matters. Oversight in depth had not been carried out in recent years. The fears of some segments of the populace concerning nuclear power, safety, and wastes were rising. Many of these problems were unceremoniously tossed into the laps of members of the Fossil and Nuclear Subcommittee.

The Flowers subcommittee was forced to start off its work in 1977 with several other seemingly insurmountable handicaps. The subcommittee had to wait to get firm figures on the new Carter budget at

the beginning of 1977. Then the subcommittee was dealing with a relatively new agency—ERDA—which in two years of operation had barely gotten used to the idea of handling both nuclear and nonnuclear R. & D. in the same shop, side by side. The nuclear side of the agency had been accustomed to vaguely generalized presentations, usually accepted quickly and sympathetically by the Joint Committee. Now they had to learn the facts of life on budget controls, and prying Congressmen who wanted clear and meaningful descriptions of what the billions were being spent for, and also wanted picayune details instead of multimillion-dollar generalities presented in bureaucratese. On April 20, 1977, the President presented his national energy plan, after which the Ad Hoc Committee on Energy was established in the House, and Congress started to work on the President's proposal for a new Department of Energy to succeed ERDA.

On top of this, the big public issue which occupied most people's time and attention was the fight over the Clinch River Breeder Reactor. There was the little matter of authorizing for and providing oversight for the many energy programs in the fossil fuels area. With all these distractions, it is a wonder that the subcommittee did its job as thoroughly as it did.

NUCLEAR BRIEFINGS

The subcommittee began an intensive series of briefings in February 1977, which included both Federal officials and outside experts in the nuclear field. These briefings enabled the subcommittee to familiarize itself with the issues and alternatives prior to the start of the formal budget authorization hearings. The 1977 actions of the committee were complicated by the necessity to vote early in the year on the authorization for the prior year which had not been passed by the Senate. The full committee voted out this bill on April 20 by a 30–1 margin, with Ottinger alone dissenting on the grounds that the legislation enacted nuclear programs which had been voted by the Joint Committee on Atomic Energy in 1976 without consideration by the Science Committee. That particular bill went through without too much difficulty and was signed into law by June.

In 1977, the subcommittee and full committee also faced a situation which further divided their consideration of nuclear issues. One ERDA bill authorized over \$6 billion for civilian applications and went directly to the Science Committee; another bill covered ERDA's national security programs to the tune of close to \$2 billion. The latter bill went first to the Armed Services Committee, and was sequentially referred to the Science Committee because of the interest of Teague's committee in laser fusion and naval reactors both of which have non-military applications. Strongly supported by Pursell, the laser fusion authorization was increased by \$9.2 million.

In March, the subcommittee heard six witnesses who had contributed to the Ford Foundation-financed Mitre Corp. study entitled "Nuclear Power: Issues and Choices." Because the study had served as a rationale for the decision of the Carter administration on the CRBR, the subcommittee was naturally critical in its analysis.

FUNDING NUCLEAR PROGRAMS

As a result of its deliberations, the subcommittee placed greater emphasis through additional funding in a number of nuclear programs in 1977, including: nuclear waste management research; an international spent fuel storage program; a study of the adequacy of facilities at West Valley, N.Y. for handling liquid nuclear wastes with a high level of radiation; additional work in the high-temperature gas-cooled reactor program; more funding for investigation of the thorium fuel cycle; increases in the magnetic fusion program, including the Tokamak and Mirror approaches to magnetic fusion; and funding for work at the Barnwell, S.C. Nuclear Fuel Plant on alternative fuel cycles, spent fuel storage, safeguard systems and waste management.

In 1978, the biggest game in town was once again the fight over the Clinch River Breeder Reactor. This did not prevent the subcommittee from holding its annual authorization hearings on DOE, even though there were some serious jurisdictional fights with the Interior and Commerce Committees, and an authorization bill for the following year was not enacted. The approach of the subcommittee was summarized by Flowers in his remarks in the House on July 14, 1978:

The future of nuclear power in the United States depends on an aggressive approach to maintaining the breeder option, but it also requires improving our current light water reactors, developing proliferation resistant reactors and fuel cycles, and finding out just how much uranium we have and finally solving the disposal problems of nuclear waste.

NUCLEAR WASTE MANAGEMENT

Public interest ran high in the issue of nuclear waste management, and the Flowers subcommittee had four days of oversight hearings with McCormack, Mrs. Lloyd and Walgren acting as presiding officers. The hearings dealt with civilian wastes with high radiation levels, and also related problems of spent fuel handling, disposal of military wastes, and those with medium- and low-level radiation. Aside from the DOE officials who testified, plus outside experts, two of the most interesting witnesses were Dr. Alan Pasternak of the California Energy Resources Commission and S. David Freeman, Chairman of the Tennessee Valley Authority. Dr. Pasternak was the only member of the California Commission to vote in favor of siting a nuclear powerplant in California. Freeman discussed his proposal for long-term storage of spent fuel assemblies in Oak Ridge, Tenn. In addition to the work of the Flowers subcommittee in this area, the Office of Technology Assess-

ment launched a study of nuclear waste management and Teague kept closely in touch with the OTA progress in this area.

Teague and Wydler sent a joint letter on June 13, 1978, to DOE Deputy Secretary John F. O'Leary in strong support of fusion technologies. In 1978, the committee voted an increase of \$15.9 million in this promising long-range area, for a total in operating expenses of \$240.9 million. The committee held a special oversight hearing in September 1978, to review with Dr. Mel Gottlieb of Princeton Plasma Physics Laboratory and DOE officials the recent developments at the Princeton Laboratory, where a temperature of 60 million degrees centigrade was achieved—almost three times the previous highest fusion temperature. Even though fusion as a commercial venture remained a hope that would not materialize until many years in the future, the committee continued to stress this option which gave promise of providing almost limitless sources of energy.



Representative Richard C. White (Democrat of Texas), who joined the committee in 1979, and voted for the CRBR on July 26, 1979.



Representative Timothy E. Wirth (Democrat of Colorado, who served on the Science Committee from 1975 to 1979, was an opponent of the CRBR.

MCCORMACK SUBCOMMITTEE IN 1979

For the first time in 1979, McCormack, a strong advocate of nuclear energy and the breeder reactor, had the opportunity to chair a subcommittee with jurisdiction in the nuclear area. The new subcom-

mittee, named "Subcommittee on Energy Research and Production", included the following Members at the start of 1979:

Democrats

Mike McCormack, Washington, *Chairman*
 Marilyn Lloyd Bouquard, Tennessee
 Robert A. Roe, New Jersey
 Stanley N. Lundine, New York
 Robert A. Young, Missouri
 Richard C. White, Texas
 Howard Wolpe, Michigan
 Ronnie G. Flippo, Alabama
 Nicholas Mavroules, Massachusetts
 Richard L. Ottinger, New York
 Beryl Anthony, Jr., Arkansas

Republicans

John W. Wydler, New York
 Edwin B. Forsythe, New Jersey
 Toby Roth, Wisconsin
 Barry M. Goldwater, Jr., California
 Manuel Lujan, Jr., New Mexico
 Harold C. Hollenbeck, New Jersey

McCormack chose as his subcommittee staff director in 1979 Stephen J. Lanes, who had been serving on the minority staff assigned to the Advanced Energy Technologies Subcommittee since joining the committee in August 1977. A graduate of Brooklyn Polytechnic Institute with a master's degree from the City College of New York, Lanes had worked for the Atomic Energy Commission and ERDA as a nuclear engineer, as well as serving for two years as technical consultant to the Joint Committee on Atomic Energy.



Representative Barry M. Goldwater, Jr., (Republican of California) uses the glove box to handle radioactive materials at the Hanford Engineering Development Laboratory in Richland, Wash. Subcommittee Staff Director Stephen J. Lanes is at center. Others in photo are HEDL employees.



Field trip to Barnwell, S.C., Nuclear Fuel Plant. From left, Representatives Mike McCormack (Democrat of Washington), John W. Wydler (Republican of New York), and Toby Roth (Republican of Wisconsin).

The jurisdiction of the McCormack subcommittee was outlined in 1979 as follows:

Legislation and other matters relating to research, development and demonstration involving nuclear fission, nuclear fusion, electric energy systems and energy storage, geothermal and hydroelectric energy systems, basic energy sciences, high energy and nuclear physics, and policy and management programs of the Department of Energy.

The McCormack subcommittee voted a net increase of over \$200 million in the nuclear fission area—which was about 10 percent over the President's budget. Aside from the big increase for the CRBR, the subcommittee voted the following changes:

Added \$27.4 million to thermal reactor technology.

Added \$6.75 million for waste treatment technology.

Added \$5 million for waste solidification at West Valley, N.Y.

Funded CRBR for \$183.8 million, and reduced breeder reactor studies sub-program by \$40 million, for a net increase in LMFBR program of \$143.8 million.

Added \$10.5 million to fuel cycle R&D for continued studies at Barnwell, S.C., Nuclear Fuel Plant.

Added \$70 million for enriched uranium production facilities at Portsmouth, Ohio.

Authorized funding of \$5 million for the Department of Energy to establish an operations training program for all civilian nuclear power plant operating personnel, including supervisory personnel (Ertel amendment adopted in full committee).



Representative Stanley N. Lundine (Democrat of New York).



Representative Nicholas Mavroules (Democrat of Massachusetts).

EFFECTS OF THREE MILE ISLAND

The accident at Three Mile Island caused a spirited debate within the subcommittee and full committee, which also affected provisions of the Department of Energy authorization bill in 1979. The subcommittee held field hearings at Three Mile Island, as well as hearings on nuclear powerplant safety, nuclear waste management, and low-level radiation. The \$5 million training program authorized by the Ertel amendment was directly related to the Three Mile Island accident, as were other amendments.

Glickman unsuccessfully presented an amendment to switch 5 percent of the authorization for nuclear fission into fusion, solar, coal and all other nonfission programs. "In all candor, this amendment was precipitated by the Three Mile Island accident," he explained during the full committee markup on April 26, 1979. McCormack denounced the amendment in these terms:

I think it represents the height of folly and also the height of hysterical reaction.

After a spirited debate, the Glickman amendment was defeated, 24-10. Glickman was then joined by Ottinger, Wolpe, and Volkmer in presenting in the committee report "Additional Views" along the lines of the amendment. They stated:

Even the most vigorous supporters of nuclear fission need to acknowledge the fact that public sentiment in the aftermath of the Three Mile Island incident has

grown increasingly wary of rapid development of nuclear fission plants until additional steps are taken to address the safety questions that became increasingly evident as a result of that incident.

These were comments, however, not representing most of the committee members, who remained strongly supportive of nuclear fission as an important factor in the Nation's energy future.

Wylder epitomized this view when he stated in mid-1979 that one of the committee's greatest contributions had been to help stabilize public opinion with reference to nuclear policy. He noted:

The accident at Three Mile Island was a severe blow to the use of nuclear power to generate electric power in this country. The national hysteria that followed, fostered to a large extent by incomplete and, frankly, irresponsible media coverage of the event, was building to the point where many perfectly safe nuclear facilities would have been shut down. Additional nuclear projects, only on the drawing board, would have been scrapped. I feel that the debate our committee engaged in and the reasoned, responsible posture of most of our Members did much to stabilize the situation and introduce rationality to the controversy. The debate is by no means over, but partially due to our efforts, the atmosphere is calmer, especially in the Congress.

Yet the issue was unlike many of the earlier arguments which had occupied the committee in its past efforts to search for the truth. Facts were assembled, digested, and reiterated. But very few minds were really changed. The critics of nuclear power on the committee felt that their support throughout the country had been materially strengthened since the Three Mile Island accident.



View of the fast flux test facility on the Department of Energy's Hanford site, 7 miles north of Richland, Wash. The FFTF will test breeder reactor fuels and materials. The Science Committee authorized the project, at a construction cost of \$647 million.

Advanced Energy Technologies

During the period from 1975 through 1979, the subcommittees chaired by McCormack and Brown produced the greatest volume of legislation emanating from the Science Committee. In addition to the annual authorization bills, these subcommittees concentrated on a number of innovations in public policy in the fields of energy and the environment. Imaginative leadership and excellent staff support helped shepherd these bills successfully through the legislative process to final enactment.

From his leadership as chairman of the task force on energy, and the Subcommittee on Energy, from 1971 through 1974, McCormack had a running start in the energy field. When the jurisdiction of the Science Committee was expanded to include energy R. & D. of all types, McCormack advanced a series of strong arguments in favor of a single energy subcommittee which he himself wanted to head up (see chapter XV.) As the result of a vote taken among the senior committee members, the energy jurisdiction was split into two subcommittees. McCormack named his subcommittee in 1975 "Energy Research, Development and Demonstration" and the subcommittee included the following members:

Democrats

Mike McCormack, Washington,
Chairman
Ken Hechler, West Virginia
Don Fuqua, Florida
James W. Symington, Missouri
George E. Brown, Jr., California
Ray Thornton, Arkansas
Richard L. Ottinger, New York
Henry A. Waxman, California
Philip H. Hayes, Indiana
Tom Harkin, Iowa
Jerome A. Ambro, Jr., New York
Christopher H. Dodd, Connecticut
Robert (Bob) Krueger, Texas
Marilyn Lloyd, Tennessee
James J. Blanchard, Michigan
Timothy E. Wirth, Colorado

Republicans

Barry M. Goldwater, Jr., California
Alphonzo Bell, California
John W. Wydler, New York
Larry Winn, Jr., Kansas
Louis Frey, Jr., Florida
Marvin L. Esch, Michigan
John B. Conlan, Arizona

JURISDICTION

The jurisdiction of the McCormack subcommittee in 1975 included the following:

Legislation and other matters relating to: geothermal energy; solar energy (including wind and other indirect forms); physical research; advanced energy systems; energy transmission; energy conservation; energy utilization; tidal energy; energy conversion technology; special oversight of nuclear energy research and development; and the annual authorization of the Energy Research and Development Administration (ERDA) except fossil fuels and nuclear research and development.

McCormack started his subcommittee off at a torrid pace. He initiated the practice of holding 8 a.m. hearings, which was before breakfast for some of the witnesses and committee members. The major reason for scheduling the extra-early sessions was that there simply weren't enough committee hearing rooms to go around. But McCormack recognized the public relations advantages of the unusual schedule. In a press release on February 17, 1975, commenting on the new practice, McCormack stated:

The Members of Congress are serious about the new leadership role we have. It is unusual to begin hearings so early, but with our full schedule, it is necessary to extend the working day if we are to be responsive.

At the first subcommittee hearing on February 18, McCormack noted:

The willingness of the members of this subcommittee to begin early and work late shows clearly that the Congress views energy R. & D. as important and worthy of the kind of hard work that is necessary to provide the depth of analysis needed to resolve complex issues.

AREAS OF EMPHASIS

Briefings by the Office of Technology Assessment, ERDA officials and outside experts helped the newer subcommittee members get a handle on the new energy R. & D. programs. By the time the formal subcommittee authorization hearings opened, some members of the subcommittee knew as much or more about the ERDA programs as ERDA officials themselves—especially since many of the ERDA officials were fresh from the Atomic Energy Commission and had little experience with nonnuclear energy. Running through the approach of most subcommittee members was the determination that more should be done by ERDA in the areas of solar, geothermal, all renewable resources, and conservation.

"I am certain that the Members of Congress will insure that these programs are adequately funded and implemented in accordance with the laws we enacted last year," McCormack stated as the hearings opened. The vigor with which members of the subcommittee and other

Congressmen supported and expanded these programs came as a surprise. At the first markup of the subcommittee on March 5, McCormack observed:

If there is any one message that has come out of these hearings we have had during the last two weeks, it is the impatience of members of this subcommittee with the nonnuclear energy and development programs that have been presented as part of the ERDA budget.

LET'S GET MOVING

Ottinger first expressed that impatience on the opening day of the hearings when he addressed Dr. James S. Kane, ERDA's Acting Deputy Administrator for Conservation:

In terms of the ERDA budget, overall, I think you ought to be in there fighting. You ought to be telling us that you're going to capture the major part of this budget.

McCormack countered that since OMB set the budget figures, he didn't feel it was "quite fair to ask Dr. Kane to criticize the ratios between his budget and the other parts of budget." Hechler, Ottinger, Dodd, Hayes and other subcommittee members jumped in to stress the strong interest in greater ERDA emphasis on conservation and renewable resources. They repeatedly goaded ERDA toward greater effort, pounding away at the need for more urgency. By the time ERDA Administrator Seamans appeared for the windup of the McCormack subcommittee hearings on February 28, 1975, McCormack pressed him to come up with better dollar figures on what ERDA could adequately spend, explaining:

We are in a real sense on a honeymoon. But all political history indicates that such honeymoons are short-lived. I think if we are going to get this program off the ground, we should establish our patterns, our traditions, our precedents and our jurisdiction and do it aggressively now. That is what this committee wants to do. I suppose this is the only hearing that I have ever heard of in Congress where we have had a persistent discussion for two weeks of trying to push the administrative agencies in taking more money. Usually it is the reverse.

Dr. Seamans responded by bridging the time gap back to a day in April, 14 years earlier, when the old Science and Astronautics Committee had really spurred NASA. Dr. Seamans recalled the scene in the cramped quarters of the hearing room in 214B of the Longworth Building after Gagarin's 1961 flight (see pages 83-87).

You made the statement that it is very unusual, and perhaps it had never happened that a committee of Congress tried to convince an agency that more funds were required. I can remember a similar instance, just for the sake of history. That was in 1961 before we had these lovely surroundings here—when we were over in another building in a very small hearing room. The Congress was extremely upset that more was not being done in this country in the field of space exploration. I still have lots of scar tissue on my back from those hearings. So it has happened before and as you can see, Congress did have an impact then.

GOLDWATER CAUTIONS FISCAL RESPONSIBILITY

With the aid of the equivalent of six man-months of work early in February by OTA staff, followed by hearings, then another OTA review of the hearings, plus private discussion between the committee staff and ERDA staff, the subcommittee by markup time had a clearer idea of where increases could profitably be recommended. Goldwater was a cautionary force. At first he objected that he had not been in on the staff discussions which resulted in recommended increases. Then he questioned whether it wouldn't be better to allow ERDA to get started and come back later if they found they needed more funds. Finally, he raised many questions about whether ERDA could wisely and efficiently spend additional funds beyond their budget. Ottinger pointed out that the President had been lecturing the Congress for not doing anything in the energy area, adding: "I think we have an obligation to get ERDA geared up in these fields as fast as they can productively do it." Goldwater disagreed:



Representative Mike McCormack (Democrat of Washington) presides over hearings on solar, geothermal, and conservation technologies. From left, Willis D. Smith (staff), McCormack, Dr. J. Thomas Ratchford (subcommittee staff director), Charles A. Trabandt (staff), Representative Barry M. Goldwater, Jr. (Republican of California).

We have no obligation to the President. Our obligation is to the people and the taxpayers, and I think in doing that we should be responsible in our analysis of these programs. I don't think anyone on this panel is opposed to these programs. I think the thing we've got to be careful about in these authorizations is that we just don't be overcome with the thought that just pure money is going to do it.

At one point, when the staff recommended a big increase, Goldwater asked: "Who's been throwing darts?" McCormack defended the need for early action and added:

We have responsibility to take the leadership. The Administration has clearly handed us the ball in this area.

Ottinger, Hechler, Frey, Harkin and most of the members of the committee spoke out for huge increases, while Goldwater frequently interjected his own reluctance to leapfrog ahead that fast:

I am hopeful that we don't try to get into this game of king of the mountain, seeing who can outspend who just under the guise of doing good for the American people.

On March 5, 1975 Goldwater also attacked staff recommendations for across-the-board increases, contending that these did not represent a responsible allocation of resources among the various subprograms in the solar, geothermal, and conservation areas. By dint of some very fast footwork, by the next day Dr. Ratchford was able to report:

Mr. Goldwater, you raised a very important issue yesterday, and that is how does one set priorities between subprograms and within an important overall program like solar energy? What we did pursue after our discussion yesterday was to go back to the program managers at ERDA who have responsibility for solar energy and ask them: Is there a better set of priorities within the total program?

Armed with the more detailed information, Dr. Ratchford prepared a special set of figures which he labeled "The Goldwater Table." Thereafter, references to the "Goldwater Table" had a remarkable effect in easing the opposition of the gentleman from California.

WHO HAS ASKED YOU TO GO SLOWER?

In July 1975, Dr. John Teem, ERDA's Assistant Administrator for solar and geothermal programs, told the committee that ERDA had been criticized for being too conservative, and also criticized for being too optimistic. Skeptical, Hechler asked him:

Name a single Member of the House or Senate who has leaned on you to go slower or has criticized you for being too optimistic.

Dr. Teem responded:

I believe at one point that Mr. Goldwater did make some comments to me that we not move so rapidly; that we would be irresponsible fiscally. I can't remember any other things at this moment.

Goldwater pleaded with the subcommittee not to be intimidated by President Ford's criticisms of congressional foot-dragging on energy. He urged that Congress not respond by "striking out blindly back." However, after the staff did a re-review of the "most productive effort" figures with ERDA, it was Goldwater himself who made the motion to recommend most of the increases. On the other hand, Ottinger was critical and disappointed with ERDA's reaction, both in the hearings and in staff discussions. He expressed "shock and dismay" at the lack of enthusiasm which ERDA displayed in the solar area, and favored "tripling or quadrupling" the amount of effort put into solar R. & D. Frey interrupted to say: "When you take a breath, I mean to say amen."

MORE EMPHASIS ON CONSERVATION

In the area of conservation, Ottinger successfully pushed for an amendment to more than double the \$40 million asked in the budget to \$90 million, rather than the \$68 million suggested by the staff. Goldwater and Winn opposed the increase as "irresponsible" on budgetary grounds. After a brisk debate Ottinger's motion carried.

The subcommittee in its markup added about \$200 million to ERDA's budget in 1975. Goldwater lost a motion to require that ERDA come up and justify how they would spend this increase before it was obligated. Then Ottinger submitted and persuaded the subcommittee to approve a further amendment to give ERDA 4 percent additional for increased administrative expenses in the conservation area. This prompted the following exchange with Goldwater:

Mr. GOLDWATER. Don't you think you are padding the lily a bit there?

Mr. OTTINGER. Padding the lily? This is a lily that deserves all the water and fertilizer we can possibly give it, an area where it is clearly going to save the consumer and the taxpayer money.

The full committee went along with and approved all the subcommittee recommendations. To summarize, the subcommittee suggested the following major increases in operating expenses:

- Solar energy increased from \$70.3 million to \$143.5 million.
- Geothermal energy increased from \$22.8 million to \$53.3 million.
- Conservation increased from \$38.4 million to \$127 million.

The bill had been jointly referred to the Joint Committee on Atomic Energy and the Science Committee, because of the nuclear portions authorized for ERDA in the same bill. The close working relationship between Teague and Price smoothed the way with few difficulties. Both chairmen appeared before the Rules Committee to ask for a joint rule, dividing the time for debate of these and the fossil

provisions. McCormack's membership on the Joint Committee as well as the Science Committee also helped cement the relationship between the two committees, even though many younger members like Harkin and Blouin repeatedly decried the overemphasis on nuclear spending in the ERDA bill.

When the bill was debated on the floor starting June 19, Goldwater came to terms with the sharp increases:

Now, many of my colleagues in this Chamber may be startled to hear Barry Goldwater, Jr., rising so strongly in support of such massive and accelerated Federal expenditures of any kind, even in energy R. & D. * * * While I may disagree on some of the specific elements or subprogram levels, overall I am convinced that this program is a reasonable balance of accelerated energy R. & D. and fiscal responsibility. Each increase was well considered and was finalized in a fiscally responsible and technically prudent way.

Winn was not quite as enthused about the magnum increases, observing:

We should temper our enthusiasm with some realism, and not engage in trying to "outbid" one another in funding increases. Our energy program should result in fueling our homes and cars but not in fueling inflation.

HOUSE ADDS \$50 MILLION FOR SOLAR ENERGY

A surprise amendment by Representative Frederick W. Richmond (Democrat of New York) hiked the authorization for solar energy up to \$194 million—an increase of over \$50 million above what the committee had voted. Lively support was immediately generated for the Richmond amendment, including strong statements by Harkin and Emery. In vain did McCormack point out to the House that "the ERDA organization is still having trouble getting organized, and they are still coming to us and saying there is no way they can spend that money we are authorizing." But the forward momentum by those on the floor was strong enough to carry the Richmond amendment by a standing vote, 43 to 31. All but \$25 million of the increase voted in the Richmond amendment survived in the conference committee. The House geothermal energy figure was sustained by the conference committee, which also voted an additional \$21 million for conservation.

Because of the battle over loan guarantees, which extended into December 1975, a great deal of the 1975 effort of the McCormack subcommittee was diverted to this struggle. In the late summer and fall of 1975, the subcommittee held hearings to probe the use of loan guarantees for solar, geothermal, and conservation projects, as well as capital formation. Even though the major fight occurred over synthetic fuels, the interest of the Congress in the use of loan guarantees for renewable resources enhanced the value of the subcommittee's hearings.

NEEDED: MORE AGGRESSIVE MANAGEMENT

Through oversight and other means, the subcommittee helped spur a more aggressive approach by those agencies administering energy programs—particularly ERDA. For example, McCormack wrote to ERDA Administrator Seamans on March 20, 1975, pointing out:

The low key, academic management style that was characteristic of the NSF solar program cannot continue in ERDA if we are to have an effective program. One characteristic of the NSF management style was the utilization of peer review procedures to evaluate proposals. These procedures were, I understand, developed for the basic research activities of the NSF which were undertaken mainly in institutions of higher learning. In that context, peer review might make sense. But it is unacceptable, inadequate and totally unsatisfactory for the solar development and demonstration activities mandated for fiscal year 1976 and beyond.

The need for a management style that is both aggressive and effective is greatest for implementing the solar heating and cooling demonstration program.

McCormack warned that "ERDA will find itself under the gun" and "the key to success lies in effective management—a responsibility which you alone ultimately must exercise."

After ERDA had submitted its interim report on the national plan for solar heating and cooling residential and commercial applications, McCormack and Goldwater wrote to Dr. Seamans on May 2, 1975, urging a more forceful program. The subcommittee opened three days of oversight hearings on May 13, at which Goldwater commented:

Please make no mistake, gentlemen. This subcommittee will not sit by idly or passively and allow the demonstration program to be diffused in a bureaucratic or organizational morass nor diverted to a long-term R. & D. activity.

Ottinger, Harkin, Wirth, and Frey joined in to beat the drums for quicker application of solar technology, and greater urgency in the administration's efforts. At Ottinger's suggestion, Mrs. Robert (Lola) Redford, codirector of "Consumer Action Now," an environmental and consumer organization pushing for expanded use of solar energy, testified on May 15. Mrs. Redford blasted ERDA's interim report as a "slow, redtape approach." She charged:

The plan sets up a tight little circle made up of a lot of Government agencies and a handful of contractors * * *. The program as presented is almost bound to make solar energy into the Edsel of the energy industry.

This prompted this interchange:

Mr. McCORMACK. There is a limit as to how much the Federal Government can do.

Mrs. REDFORD. Absolutely. I think that solar energy will survive in spite of the Government.

ERDA TOO CAUTIOUS AND LEISURELY SOUNDING

At further oversight hearings in July, the subcommittee reviewed the progress in implementing the Solar Energy Research, Development, and Demonstration Act of 1974. Once again, members expressed the sense of urgency which they felt should be shared by ERDA. Mosher, in addressing ERDA's Assistant Administrator for Solar, Geothermal, and Advanced Energy Systems, commented:

There is a tremendous amount of enthusiasm and expectation and belief in the potential of solar energy and I am trying to think of what the average guy would think as he sat here and heard your presentation. I have a feeling that he might feel that it was a remarkably cautious and leisurely program.

In October 1975, the subcommittee held two days of oversight hearings to spur the application of the Geothermal Energy Research, Development, and Demonstration Act of 1974.

Among its many other activities in 1975, the subcommittee also somehow found time to hold hearings on helium, hydrogen, methanol, and industrial conservation. An ERDA report on "the energy related applications of helium" was the basis of the May hearing, which investigated the use of helium for superconducting transmission lines, helium-cooled nuclear reactors, and fusion reactor technology. The hydrogen hearings in June zeroed in on the possibilities of producing hydrogen in large quantities at economical rates, and examined storage, transportation, and environmental problems associated with hydrogen. The two days of hearings on methanol, complementing methanol hearings held in the Fossil Fuels Subcommittee, investigated the use of methanol (wood alcohol) as a potential automobile fuel, natural gas substitute and feedstock for the chemical industry. In September 1975, the subcommittee also held three days of hearings on methods of speeding up the development and utilization of industrial conservation technologies.

THE INITIATIVE ON ELECTRIC VEHICLES

In March 1975, McCormack and Brown teamed up to introduce legislation which represented one of the major statutory initiatives of the committee—the electric vehicle research, development, and demonstration bill. In their statement introducing the bill, McCormack and Brown pointed out that electric cars had a great potential for more efficient energy use as well as a reduction in pollution. The bill called for advanced research on electric vehicle storage and propulsion systems, along with a demonstration project enabling 8,000 electric vehicles to be used over a 5-year period by government, industry, and

individuals throughout the Nation. Teague, Mosher, and Goldwater joined in cosponsoring the bill, and before long almost all the Science Committee members had climbed aboard the electric vehicle bill, which carried a price tag of \$160 million.

For McCormack, it was a personal crusade. In announcing hearings by his subcommittee in June, he stated:

Our ultimate goal is the widespread manufacture and use of electric cars throughout the country. We know that electric cars will not compete in the foreseeable future with vehicles driven by internal combustion engines powered by gasoline or alcohol. However, electric cars are good enough today to provide much of the transportation that Americans need, particularly for trips to and from work, school and market.

The importance of this demonstration program cannot be overestimated. In fact, the development of electric cars could do more to decrease our dependence upon foreign supplies of petroleum than any other single thing that we might do. This is clear because electric cars available today can meet the bulk of our personal transportation needs, and the amount of petroleum we now consume for automobiles is comparable to a large portion of our total imports.

OTTINGER JOINS IN

Ottinger, frequently at loggerheads with McCormack over nuclear fission, enthusiastically endorsed the legislation (along the lines he had himself first sponsored in 1967) and began to use an electric car to advertise his support. He also advocated the encouragement of steam cars, and hybrid autos which could use the electric system up to speeds of 30 miles per hour (which consume the greatest amounts of gasoline) and the internal combustion engine above that speed. Hybrid systems, Ottinger pointed out, would enable the use of your car on gasoline while the batteries were being recharged. Goldwater, Brown, Harkin, Hechler, and Mosher all endorsed the bill enthusiastically. The first negative note came from ERDA, in a faint-praise damnation from ERDA's Assistant Administrator for Conservation, Dr. James S. Kane, who told the McCormack subcommittee on June 3:

Carrying out a demonstration phase too rapidly may hinder, rather than foster, acceptance of electric vehicles. * * * It disturbs me to take a stand against a bill whose goals are so obviously in the best interest of the Nation.

McCormack had a ready reply for ERDA's negativism (or no doubt it was OMB-directed negativism):

We very much appreciate your testimony, and I must say I'm not dismayed by it. After all, the entire organizational structure of the executive branch came in and opposed the geothermal bills too, but we ultimately persuaded them to join us, and I propose to do the same thing in this case.

With the help of the Electric Vehicle Council, McCormack arranged for 20 electric cars to be placed on display in front of the Rayburn Building. Naturally, all Members of the House and Senate

were invited to come down and take a spin. And to make everything more attractive, photographers were present to insure that every Congressman who manned the controls would have a glossy print for publication in his local newspapers and in his constituent newsletter as well. It was a public relations triumph for the electric vehicle bill.

SNAKES UNDER THE ROCKS

ERDA witnesses tried desperately to justify their opposition to the bill. Dr. John Brogan of ERDA's Division of Transportation morosely declared:

We certainly don't want to find some snakes under the rocks ten years from now on something that was overlooked.

Hechler interjected:

Since Dr. Brogan is concerned about the snakes under the rocks, I suggest that we call the first electric car "The Mongoose."

Widespread editorial and trade magazine support, supplemented by nationwide constituent interest, helped propel the bill along toward early enactment. The full committee unanimously approved a version which incorporated Ottinger's suggestions that hybrid electric-gasoline vehicles be included. Teague brought the bill to the floor on September 5, 1975. McCormack explained to the House the philosophy back of the committee's action:

As we on the Science and Technology Committee have analyzed the energy crisis and tried to provide solutions, we have picked pressure points where a small change in technology that is socially, economically and environmentally attractive can make a big difference either in increasing our energy resource base or reducing energy consumption.* * *

Switching to electric cars is such a program, particularly for second cars for urban commuting, and it has the advantage that Americans replace 10 percent of their cars each year anyway and that 40 percent of our cars are second cars.

FEDERAL USE OF ELECTRIC VEHICLES

The bill provided for introduction of electric vehicles into the vehicle fleets of the Postal Service, GSA, Department of Defense and other Federal agencies, as well as making them available for lease-purchase to industry and private individuals. A loan guarantee program and small business provisions were included to protect manufacturers and encourage smaller firms.

In response to questions as to why private enterprise didn't undertake the mission McCormack was assigning to ERDA, he answered:

We have a situation in America today where industry is waiting for a market and the consumer is waiting for an industry.

Emery added:

I do not think that the American automobile industry, as it is presently constituted, will be willing to move into another field of propulsion, such as electricity, unless we can demonstrate to the country that one, electric vehicles are practical; and, two, that they are available.

During the debate, McCormack pointed out that his bill provided for R. & D. to develop better batteries. He estimated that the average cost of operating an electric car was a penny a mile, as against 4 cents a mile for gasoline-powered cars (of course, that was in the good old days of 1975 when gasoline was only 60 cents a gallon).

DYNAMIC LEADERSHIP BY SCIENCE COMMITTEE

Bauman threw a small monkey wrench into the works by interrupting:

I hesitate to shatter the smiling camaraderie we have seen displayed on both sides of the aisle here, but if this legislation is so good, why are we informed that the administration opposes the bill and that it will be vetoed by the President?

Goldwater responded:

I think this is a case where the Congress is providing perhaps more dynamic leadership. The difference in the question is that we want to do it now and they want to continue study.

Brown added that the bill had unanimous support from the industry—even the so-called Big Three in the auto industry—and that it gave the opportunity to get a struggling, embryonic industry on its feet so it could make a major contribution to the free enterprise system.

This touched off the opposition of several Members, including Representative Jack F. Kemp (Republican of New York), who declared:

This is not private or free enterprise at work, it is central planning. * * * It is an outright subsidy to an enterprise already in operation.

The bill passed by a big margin on a 308-60 rollcall. The Senate took its time, and finally got around to passing the electric vehicle bill the following June. The conference committee set the program to cover the period through 1981, with the purchase of about 7,500 vehicles and their introduction into Federal, industry and private use over that time period. The full \$160 million included in the original House bill was authorized by the conference committee. In addition to the R. & D. and demonstration project established in ERDA, the legislation set up an accelerated research and development program for batteries and related technology. McCormack estimated that it would be possible to place 10 million electric vehicles on the road eventually. He estimated this would result in a savings of half a million barrels of oil a day—amounting to a cost savings of \$2.2 billion a year in imported oil (in 1976 prices).

When the conference report returned to the House on August 31, 1976, Representative John T. Myers (Republican of Indiana) raised the question of how we were going to get all the electric energy to recharge the batteries of 10 million electric cars. McCormack responded that most of the vehicle batteries would be plugged in to electric outlets at night, when there was plenty of off-peak load capacity to handle recharging. Pressed on the issue by Myers as to where the additional power would come from, McCormack answered that coal and nuclear energy would have to generate it, and also:

We must look at this matter very seriously, and consider the possible necessity of eliminating these harassing lawsuits which use extraneous fine points of the law and stretch them beyond all reasonable limits.

PRESIDENT FORD VETOES ELECTRIC VEHICLE BILL

On September 13, President Ford vetoed the bill on three grounds:

(1) It is simply premature and wasteful for the Federal Government to engage in a massive demonstration program—such as that intended by the bill—before the required improvements in batteries for such vehicles are developed; (2) ERDA already has adequate authority * * * to conduct an appropriate electric vehicle development program; and (3) Private industry already has substantial experience and interest in the development of practical electric vehicle transportation. I am not prepared to commit the Federal Government to this type of massive spending program which I believe private industry is best able to undertake.

McCormack and his allies organized a major national effort to override the veto. He reflected:

But for me, as a rather junior member, without asking anyone else's permission, I simply said: "This is what I am going to do." I told the Speaker and the committee chairman: "I'm going on the floor and move to override."

Night letters went out to hundreds of influential organizations and individuals throughout the Nation. The responses began to pour in to House and Senate Members from the International Brotherhood of Electrical Workers, the National Council of Electric Companies, the Edison Electric Institute and others. Dr. Edward E. David, Jr., executive vice president of R. & D. at Gould, Inc., a manufacturer of battery products (former Presidential science adviser, who also testified before the committee on behalf of the electric vehicle bill) helped organize persuasive letters to Congressmen in Gould's sales area.

Teague, Mosher, and Goldwater joined McCormack in a "Dear Colleague" letter the day after the veto, countering the President's statements. They argued that "this bill will provide the incentive for engineering development of even more advanced batteries and other electric vehicle technologies needed in the future." They contended that the program would not be in competition with private industry:

It does provide government support for development of safe, higher performance electric vehicles which will be designed and produced by private industry. This

government support also will assist small businesses interested in manufacture of electric vehicles for the demonstration program and for consumers.

ORGANIZING HOUSE TO OVERRIDE THE VETO

In a cleverly worded appeal to their colleagues, Ottinger and McCormack teamed up with a statement which began: "Guess who agree the President is wrong!!— Ottinger and McCormack, McCormack and Ottinger." The letter urged House and Senate Members to "short-circuit the electric vehicle veto," and "we urge you to plug in your electronic voting card and support the electric vehicle override." Supporters of the bill divided up the membership of the House and Senate, and made personal calls to urge that the veto be overridden.

On September 16, the House had a lively debate on what to do with the President's veto. Teague led off by stating that he was "frankly puzzled" at the action of the President. He concluded:

The only explanation of the veto that makes any sense is that the President received some bad advice.

Teague sketched in the progress being made toward development of nickel-zinc batteries to replace lead-acid types, to be followed by "second generation batteries such as lithium-sulfur." McCormack underlined the congressional initiative on the bill, following the solar and geothermal bills passed in 1974. He starkly referred to the fact that, looking out from Capitol Hill toward the Washington Monument, he had seen a "brown pall of smoke covering Washington, D.C." McCormack stressed the dire need for vehicles that did not pollute and contaminate the atmosphere.

Goldwater started out in a peculiar fashion, denouncing the Democrats in Congress for "spending dollars we do not have and spending large amounts of money on 'soft' projects and jobs that produce no real substantial economic impact." He stated:

I was greatly surprised that the President chose to veto this act. Regretfully, I would have to concur with my colleagues that he may have been misled on this particular piece of legislation.

Goldwater said that if the White House had any objections to the legislation, those objections were certainly not communicated to him before, during or after consideration of the conference report. He denied the program would be wasteful, extravagant or ill-considered, and concluded:

The Congress is overwhelmingly supported by the evidence that its approach is sound and will be effective.

WYDLER SUPPORTS PRESIDENT'S VETO

Wydlar, the only committee member to speak in support of the President's veto, cited an interagency report which was pessimistic on

the future of electric cars. The report was negative on the technological advances possible in batteries, and concluded that the effect on petroleum consumption would be minimal. Wydler concluded:

Nobody knows if these vehicles are going to work, nobody knows how well they are going to work, and nobody knows what we are going to do with them if they do not work.

He advised that the budgetary situation was in such bad shape that he felt obliged to vote to sustain the veto.

Ottinger refuted Wydler's statement that the electric cars didn't work, pointing to his own experience and that of Representative Charles Rose (Democrat of North Carolina), who drove to and from the Capitol every day in their electric cars. Brown suggested that the President's veto might stem from Congress initiating the bill rather than the White House. He also talked about the problem of "technological inertia" which seemed to grip those administering many programs:

In some areas we have so specialized and institutionalized our technology that we have established overwhelming barriers to change. Long after the conditions which spawned the technology have passed away, we are often still locked into an out-moded pattern—technologically inflexible dinosaurs facing extinction in a changing world.

VICTORY FOR THE COMMITTEE

There were a few more speeches, but Members had already made up their minds. When the roll was called, the supporters of the bill succeeded in overriding the veto on September 16, 1976 by 307 to 101, comfortably above the necessary two-thirds. Wydler and Jarman were the only committee members to vote to sustain the President's veto, which was also overridden in the Senate by 53-20 on September 17. It was a significant victory for the committee and especially for McCormack who had led the fight. McCormack took particular pride in the fact it was only the 89th occasion in American history that a President's veto had been overridden.

On July 12, 1977, the McCormack subcommittee held a one-day hearing on the program objective and schedule for the "Electric and Hybrid Vehicle Act," passed over the President's veto in 1976. McCormack related to the subcommittee that there had been a 9-month delay in action to appropriate money to implement the act, after which the House Appropriations Committee had severely underfunded that program in 1977. An effort by committee members to overturn the Appropriations Committee action and increase the funding was defeated on the House floor in 1977. Thus, the "technological inertia" described by Brown was matched in 1977 by "appropriations inertia." McCormack still felt that "we will have small electric vehicles that

can compete in the second car market for in-town commuting in 5 to 7 years. Perhaps that is optimistic, but I hope not."

David Freeman of the White House energy staff, later to become Chairman of the TVA, gave enthusiastic support to the development of electric vehicles in his 1977 testimony before the McCormack subcommittee. Parenthetically, Freeman appeared without a necktie, which he explained was not intended to be disrespectful to the committee but part of a program to emphasize summer energy conservation. This prompted McCormack to observe:

The last time I took my necktie off was when the Vice President of Con Edison of New York came in without a tie. He wore a sport shirt, and said they were encouraging all their executives to wear sport shirts in the summertime and not turn the temperature down too far.

McCormack took the initiative to suggest a stretched-out schedule for the electric car program. In legislation which the President eventually signed on February 25, 1978, the number of authorized vehicles was increased from 7,500 to 10,000, and time period lengthened into 1986.

The original timetable for electric vehicle development might have been optimistic, in light of the complex component and technology integration features, and the slowness with which batteries were perfected. Bolstered by an adverse GAO report, in 1979 Wydler (who had supported President Ford's veto of the 1976 bill) also argued against further expansion of the program in 1979. The 1978 bill called for 1,700 electric vehicles, but the DOE only asked for 700, so Harkin led the drive to compromise on 1,100 by adding \$8 million to the DOE budget in 1979. Wydler unsuccessfully tried to eliminate the 400 extra vehicles. But Harkin, strongly supported by McCormack, contended that light delivery vans in use by stores, industry, universities and the Postal Service justified additional demonstration vehicles. Harkin also argued that the Wydler amendment would slow down the testing of new, upgraded battery designs. The Wydler amendment was defeated by the full committee in a voice vote.

SOLAR, GEOTHERMAL, AND CONSERVATION INCREASES IN 1976

The McCormack subcommittee had nine days of ERDA authorization hearings in the spring of 1976. Even though the bill itself was not approved until the following year, the subcommittee once again broke new ground in providing new stimulus in the highly popular solar, geothermal and conservation areas. An indication of the increases in operating funds voted in 1976 may be seen by the following table:

(Dollar amounts in millions.)

	President's budget in 1976	Committee increase	Total com- mittee bill
Solar	\$162.5	\$66.7	\$229.2
Geothermal	50.1	25.0	75.1
Conservation	120.0	82.5	202.5

But despite the generosity of the subcommittee in its recommendations, there were some stormy scenes within the subcommittee during its hearings. After the customarily complimentary references to ERDA Administrator Seamans in his first 1976 appearance on January 22, Ottinger lashed out:

I do not feel that I can join in the accolades my colleagues have expressed with respect to the job on this budget.

Ottinger wanted to know why Dr. Seamans wasn't going to bat more strongly for solar, geothermal, and conservation R. & D. He charged that ERDA was ignoring the will of Congress in not fighting harder for conservation funding. When Dr. Seamans pointed to a 65 percent increase, Hechler responded "Peanuts times peanuts equals peanuts."

Thornton, the author of an ingenious conservation program called the "Energy Extension Service," remarked jocularly:

There are people in my part of the country who consider that the greatest conservationist of all times was Herbert Hoover, because while he was President factories were closed, automobiles were not running, and there was very little consumption of energy.

When McCormack presented his bill on the House floor on May 19, 1976 he observed:

We walked a veritable tightrope between two diverse groups. On the one hand we face those guardians of the Federal Treasury who would criticize us for irresponsibly throwing money at a program without carefully scrutinizing the merits of each proposed activity. On the other hand, there are those Members who feel that rapid development of alternative energy technologies is so important that we risk making mistakes in program management to spur the activities on at a hectic pace—fully anticipating that there will be wastes and failures.

THE HOUSE AGAIN UPS THE ANTE ON SOLAR ENERGY

A fight broke out on the House floor on solar energy. Representative James M. Jeffords (Republican of Vermont) introduced a popular amendment to add \$116.2 million for solar energy technologies—fully 50 percent beyond the steep subcommittee increases. Ottinger, who had played a key role in getting the subcommittee increases approved, broke ranks and jumped onto the Jeffords band-

wagon. The groundswell of House support for solar energy was so heavy that McCormack termed the Jeffords amendment the "motherhood and God" amendment. In vain, he argued that it was simply "a Christmas present for all the well-wishers and all the people who would like to do something nice in solar energy." McCormack added:

This is simply throwing money at a technology without having the slightest notion of what this money would accomplish.* * * We all want to develop solar energy as rapidly as we can, but not irrationally.

Goldwater also argued that Congress should be "responsible":

We cannot jump out into midair without knowing where we are going to come down.

A loud argument ensued as to whether ERDA could use the money effectively, whether OMB was holding back efforts in the solar fields, and whether the branch chiefs and field centers didn't have a better idea of what they needed than their bosses at ERDA headquarters. Frey gave a boost to the amendment when he observed:

ERDA has been rather slow in the solar area. I do not really get a sense of urgency with ERDA in terms of alternative energy. Anything we can do to kick wherever they have to be kicked would be a very beneficial thing.

By now it was apparent that unless drastic steps were taken, the Jeffords amendment seemed certain to pass. Brown rescued the initiative, if not the budgetary figure, for the subcommittee. He introduced a substitute which would include the same \$116.2 million increase over the committee figure but distribute it throughout solar heating and cooling as well as the other aspects of solar energy covered in the Jeffords amendment. Representative John B. Anderson (Republican of Illinois) was narrowly defeated in an attempt to cut the increase in half. Then McCormack endorsed the Brown compromise which won out. It is interesting that when the Senate and the appropriations process got finished working over the ERDA funding, the net amount was still an increase of over \$60 million above the figure initially reported out of the subcommittee as a result of the 1976 deliberations.

HOUSE IS BULLISH ON SOLAR ENERGY

The House was clearly in a runaway mood for solar energy in 1976. Many Members and their constituents shared the bold pronouncement made by Ottinger:

If we could only sell the sun to Standard Oil, we would have the problem licked, because then ERDA would be interested and we would get the kind of push that has been exhibited in other technologies.

There was an impatience with those who counseled that you couldn't buy R. & D. off the shelf. There was a restlessness among those who feared that the old bureaucrats just didn't have the zing to take the risks needed to develop new technologies. Whatever program the

committee came up with, the House and the people who elected the House wanted Congress to move faster to try and insure earlier use of solar and geothermal energy, and to a lesser extent perhaps apply conservation (mainly for the other guy).

Productive work on two other legislative landmarks occurred in 1976 and came to fruition in 1977—the Energy Extension Service and the Automotive Transport R. & D. Act. Both pieces of legislation represented initiative by the subcommittee, with not too much encouragement from the administration, and are outstanding examples of the influence on public policy by the committee.



Representative Ray Thornton (Democrat of Arkansas), father of the Energy Extension Service.

THORNTON AND THE ENERGY EXTENSION SERVICE

The Energy Extension Service was Thornton's brainchild. It grew from his experience, the challenge of the energy crisis, and the unfolding of the problem of relating conservation to people at the grassroots. As a member of the Committee on Agriculture, representing a vast rural area in his home State of Arkansas, Thornton quickly grasped the difficulties which average people had in understanding the highfalutin decisions being voiced in the marble halls of the Federal bureaucracy.

Early in 1975, Thornton leaned toward the concept of an energy conservation corps, essentially to help small businessmen and others

in conservation and more efficient use of energy. To watch Thornton operate is to appreciate how his ideas are generated, focused and refined as, like fine wine, they improve with age. Through careful questioning of expert witnesses, by bounding various suggestions against the counter-suggestions of others, and by assimilating and coordinating a vast amount of advice, Thornton gave the Energy Extension Service clearer form as time went on. It started with Thornton's faith in the success of the agricultural extension agents, and their closeness to the people with whom they dealt. More and more people were drawn into the "think tank," yet Thornton kept a firm hand on the central theme lest it get lost in having too many cooks stir the broth.

When the full committee assembled to mark up the ERDA authorization bill in 1975, Thornton persuaded the committee to include a section proposing the "Energy Extension Service". Even though no funds were provided, ERDA was instructed in the House committee report in 1975 to explore the possibilities of establishing the Service "to provide expertise, consultation, dissemination of information, and receive advice on the nature of energy use and problems." The report added:

Such a service could answer questions and give advice to individuals, businesses and state and local government officials on energy conservation measures and alternative energy systems, for example, the use of home insulation, solar heating and cooling equipment, or the cooperative use of solid waste by farmers and users to produce energy.

During the summer of 1975, Symington and Thornton conducted joint hearings on agricultural research and development. In October, they held joint oversight field hearings at Texas A. & M. University, the University of Missouri and Pine Bluff, Ark. They probed the manner in which Agricultural Extension Service personnel operated, in order to apply the lessons learned in the energy field. In October, Thornton was joined by Teague, McCormack and others in the introduction of legislation embodying the structure of the proposed plan. Thornton also interested a number of Senators, who then introduced comparable legislation.

When Dr. Seamans appeared before the full committee to present an overview of the ERDA budget on January 22, 1976, Thornton asked him whether there was any provision in the budget for the Energy Extension Service, and Dr. Seamans responded:

We have no funds in this budget for extension services of that sort.

Since it did not appear that ERDA would undertake this function—as was so often the case when an idea did not originate "down-town"—the McCormack subcommittee arranged to have special hearings on Thornton's bill at the end of March and early April of 1976.

In opening four days of hearings, Thornton observed:

We are dealing with an opportunity to impact positively on a major source of energy savings nationwide. We are dealing with activities which involve people-to-people contact and trust and if any program is to be effective, it must reach a broad spectrum of the American public.

McCormack allowed Thornton to preside over these hearings, and helped kick them off with this observation of his own:

This subcommittee then is committed to the proposition that this Nation must develop an energy conservation ethic in its citizens. *** We are dealing with individuals in their homes, in the privacy of their own decisions in the morning, in the daytime and in the evening—how much light they have in their houses, whether or not they insulate their homes, what temperature they have on in their homes, how they drive their cars, what kind of cars they drive, what kind of appliances they will use, what they do for recreation, all this effort to help the conservation ethic in this country. *** This legislation is designed to help people understand what we can do without damaging our standard of living, what we can do without reducing the number of jobs in this country, without causing unemployment.

GOLDWATER FEARS A MASSIVE BUREAUCRACY

Goldwater was negative on the proposal, expressing fear that such legislation "often leads to yet another massive, unresponsive, and uncontrollable Federal bureaucracy. It is the camel's-nose-in-the-tent routine all over again." But most members of the McCormack subcommittee expressed enthusiasm for Thornton's initiative. ERDA and the FEA testified they felt the legislation was duplicative and premature, which reminded Hechler of a parody of an old song: "anything Thornton can do, the administration can do better"—or "hang your clothes on a hickory limb, but don't go near the water." Thornton summoned State and local officials, representatives of consumer groups, conservationists, and those familiar with the operation of the agricultural extension service, building a good record in support of his bill.

PRESIDENT CARTER SIGNS THORNTON BILL

In marking up the bill several amendments were added by the subcommittee to insure that maximum use be made of existing extension programs, and that activity by other local groups not be negatively impacted by passage of the new legislation. The full committee then approved the bill on May 11. In his separate views, Goldwater remarked that the bill had been vastly improved and he would support it, providing the Federal Government put its conservation house in order. Goldwater deplored the fact that we simply did not know what our overall Federal energy conservation program today was doing.

The House passed the Thornton bill on August 2, 1976, and thanks to the House Rules Committee it was merged in with the ERDA authorization bill to match a comparable action in the Senate. Just

when it looked like the skids were well-greased, the loan guarantee fight derailed the whole package and the conference report on the ERDA authorization did not reach the Senate floor before Congress adjourned in 1976. But some fast footwork early in 1977 resulted in the insertion of the Energy Extension Service as a separate title in the ERDA authorization bill which the President signed on June 3, 1977.

AUTOMOTIVE TRANSPORT R. & D. ACT

Starting in 1976, the McCormack subcommittee began to concentrate seriously on passage of an Automotive Transport Research and Development Act—along the lines of the legislation cosponsored by Brown and Symington in 1974. When the House took up the conference report on the Energy Policy and Conservation Act on December 15, 1975, an interesting dilemma occurred for Science Committee members. Senator John V. Tunney had tacked on an automotive efficiency development amendment, similar to proposals being advanced by Brown, but giving authority to the Department of Transportation which would remove it from Science Committee jurisdiction. McCormack, Goldwater, and Teague attacked the provision, and Goldwater obtained a separate vote through a point of order based on germaneness. Although Brown voted for the Tunney amendment because of its substantive value, most Science Committee members opposed it on jurisdictional grounds, and it went down to defeat by 300–103.

In two days of hearings in March, McCormack and Brown presided as expert testimony was presented by representatives of the Jet Propulsion Laboratory, Massachusetts Institute of Technology, ERDA, NASA, and the Department of Transportation, as well as by an enthusiastic member of the committee, Congressman Scheuer. Teague, Mosher, and Emery also joined in sponsoring legislation authorizing R. & D. to produce automobiles which were more energy-efficient, less polluting and could burn fuels other than gasoline. Teague stated:

If we can improve the fuel economy of the automobile fleet in this country by 6 miles per gallon, that will result in savings of nearly 900 million barrels of imported oil per year. At \$11 per barrel that is about \$10 billion per year that will not be sent to the oil exporting nations.

McCormack pointed out that the automobile had developed during the period when we had vast sources of cheap energy and also when the atmosphere was considered as an infinite dumping ground that could swallow anything we could feed it. He suggested that the catalytic converter route of meeting the clean air standards inevitably had the result of a loss of fuel economy. He added:

With refinements expected from research and development, alternative engines such as the Stirling, turbine or diesel are projected to be significantly better from the standpoint of the efficiency vs. emissions than the internal combustion engine.

COMMITTEE INITIATIVE ON AUTOMOTIVE BILL

The legislation established within ERDA a 5-year R. & D. program on advanced automotive propulsion systems to supplement current R. & D. in private industry and Federal agencies. The House bill authorized \$20 million a year for the purpose. Brown, who emerged as the principal sponsor of the legislation, remarked to the subcommittee during the markup session:

What we are doing is recognizing that the market doesn't work effectively when it comes to planning for something that will be needed fifteen to twenty years down the road. As the custodians of the public welfare for a much longer period of time than the automotive companies are, it is our responsibility to supplement and to help provide the guidance and direction for that research, and that's the whole function of this bill.

Brown noted that the automobile industry when it looked to the future inevitably looked at its investment in the internal combustion engine, while it was up to the Congress to look at the situation when we won't be able to use internal combustion engines.

The role of Federal agencies and laboratories in automotive R. & D. stimulated vigorous debate within the committee. Mosher cited "the superb competence of NASA's Lewis Research Center at Cleveland, for R. & D. in all forms of propulsion." Brown and Goldwater similarly praised JPL's automotive work, although Goldwater was apprehensive of substituting Government-run, owned and operated facilities for the private sector. The committee felt that ERDA had a more imaginative attitude toward R. & D. and technology development than DOT, hence the bill restricted DOT's role to vehicle safety. Despite the fact that Goldwater offered 11 critical amendments which were adopted by the subcommittee, he still opposed the bill. Goldwater told the House on June 3:

The bill has been materially reshaped by the 11 amendments I offered which were adopted.* * * My most severe objection to the bill is what it can become in conference; and how the conference bill might circumvent the safeguards in my amendments, which are now in the House bill.

He was basically concerned that the legislation might induce unfair Federal competition with the research currently being conducted by the automobile companies. Despite very patient consideration of Goldwater's views, including extensive colloquies during the House debate in which Brown, McCormack and Mosher reassured Goldwater on the safeguards included in the bill, when the roll was called Goldwater lined up with the opponents of the legislation. The House vote on June 3 was 298-86. Esch and Jarman were the only other committee members who voted against the bill.

THE AUTOMOTIVE BILL GOES TO THE WHITE HOUSE

The Senate acted speedily on the bill. When the conference committee assembled, the conferees agreed on a \$25 million authorization the first year and \$75 million the second, with subsequent authorizations in the 5-year program to be determined later. Goldwater was pleased that the conference committee had stuck closely to the House bill. He saw that the Goldwater safeguards were preserved, allaying his fears of a massive Federal encroachment on private industry. He wound up voting for the conference report on August 31. He told the House:

I think that this bill demonstrates how the legislative process can work effectively and responsibly to provide full and open consideration of proposals and alternative viewpoints.

Brown and Mosher both expressed pride in the product of the conference committee. Mosher in particular was pleased with the new partnership between Government and industry. He told the House on August 31:

This automotive partnership will see ERDA and NASA serving as a "technical broker" between industry and the regulatory agencies; I feel certain they have the technical credibility to make it work.

The conference report was adopted by a margin which seemed veto-proof, 344-39; Esch of the motor State of Michigan was the lone committee member registered in opposition.

PRESIDENT FORD VETOES AUTOMOTIVE BILL

President Ford sent down a sharp veto message which charged that the carefully developed legislation "would unnecessarily duplicate existing authorities and extend into areas private industry is best equipped to pursue." The President contended that both ERDA and the Department of Transportation "already have sufficient authority" to develop new automobile engines. The Michigan-born President noted that "private industry has substantial expertise and interest in the development and production of advanced automobiles," and that the Federal Government should "not extend into borderline commercial areas which private industry is best able to perform."

As the 1976 Congress drew toward a close, the committee pulled out all stops to mobilize support to override the President's veto. There was an air of confidence, based on the huge affirmative vote rolled up for adoption of the conference report, as well as the success of the committee in organizing the overriding of the electric vehicle bill veto. Brown wrote his colleagues on September 28:

The automobile is the single largest user of imported oil, and the most inefficient user.* * * You will be doing both your constituents and your country a favor by voting to override the veto.

Teague, Fuqua, McCormack, and Brown sent out a joint letter, pointing out that the legislation included the specific phrase that the program would "supplement, but neither supplant nor duplicate, the automotive research and development efforts of private industry"—a choice of words first offered by Goldwater. The letter also commented:

The President correctly states in his veto message that authority already exists for ERDA to launch such a program. But the fact remains that ERDA has not chosen to initiate such a program on its own. * * * The Nation is looking to Congress for leadership in this critical area. We urge you to vote to override.

CONGRESSIONAL INITIATIVE AND LEADERSHIP

The debate on the President's veto message in the House on September 29, 1976, was brief, but heated. The opposition was led by Representative John H. Rousselot (Republican of California) and John B. Anderson (Republican of Illinois), both of whom challenged the duplicative nature of the legislation and its expense. Brown, Mosher, Teague, McCormack, Ottinger, and Hechler all spoke in favor of overriding the veto. While conceding that ERDA and DOT already had the authority to go ahead without new legislation, Mosher put his finger on the problem when he stated:

But the crucial fact is this, that DOT and ERDA seem not likely to accomplish the purposes of this bill, unless the Congress gives them the push, the mandate which Congress clearly intends in our overwhelming support of the bill. * * * I see the bill as a prime example of the kind of congressional initiative and leadership, in giving positive, creative direction to national policy—the kind of leadership we should demonstrate more often.

Brown pointed out that a recent General Motors report had favored "Government research of a basic type, in areas which now represent critical bottlenecks in the industry's efforts on advanced powerplants." The General Motors report further stated that such Government research "would supplement rather than duplicate the efforts of industry and thus make real contributions to progress." McCormack told the House:

The fact is that these ERDA programs are spread so thin that we are not moving forward as we should be doing in this area. These programs are not able to concentrate where most fuel is being consumed today, in our automobiles. * * * The fact is, Mr. Speaker, that it does us no good to set mandatory mileage requirements for our automobiles at certain dates in the future, such as 1980 or 1985, unless somebody does the research to provide the technological information that will make such advances possible.

Ottinger argued:

This program simply helps fill the gap because of the tremendous inertia of the automobile companies in developing alternative systems of propulsion. * * * The internal combustion engine in our society is the greatest waster we have and it seems to me to fund this program is one of the best investments we can make in the future.

Goldwater kept very quiet during the debate on the President's veto. Here was the same bill he had spoken out for when the conference report was being passed several weeks earlier. His favorable remarks were quoted on the floor when the veto message was being considered. But he wound up voting with the President to sustain the veto. Only two other committee members, Bell and Conlan, joined him.

THE HOUSE OVERRIDES, BUT THE SENATE SUSTAINS VETO

The appeals and the organizational effort were once again effective. The House on September 29 voted by 293 to 102 to override the veto—29 votes more than the necessary two-thirds. But the efforts were sand-bagged in the Senate, where Senate GOP Assistant Leader Robert P. Griffin of Michigan rallied 35 votes. Senator Griffin came down hard against expansion of Federal programs like the automotive R. & D. legislation. The 1976 campaign had included a great deal of rhetoric on overexpanded Federal programs which helped to buoy Griffin's arguments. The Senate vote was 41-35, insufficient for the necessary two-thirds to override.

Picking up the pieces, Brown and McCormack wrote to their House colleagues on December 14, 1976, inviting them to cosponsor the same bill in 1977. The response was overwhelming. When the new Congress assembled in January, Brown and McCormack decided that they would short circuit the tedious legislative process. Instead of going through the agonizing procedure of rehearing the entire bill, they incorporated it into the DOE authorization act.

This was accomplished in one deft stroke by Brown, when the DOE authorization bill had reached the amending stage on the House floor on September 21, 1977. The reason the bill came up so late in the year was that the bitter fight over the Clinch River Breeder Reactor had delayed the bill. As a matter of fact, Brown's action was akin to sending a small patrol through the enemy lines while the cannonading over the CRBR was going on in another sector. He simply rose and offered the 5-year automotive propulsion R. & D. legislation as a separate part of title III in the DOE bill, with these words:

I rise to offer an amendment to Title III which had been worked out with the administration and the various Members who have been actively involved with this

automotive propulsion research and development program. The amendment is basically technical, and as far as I can discern, there is no controversy.

When necessary, Brown had a low key fashion of presenting earth-shaking legislation in a reassuring fashion, with the best bedside manner. He calmed any possible fears by noting that "the only surprise is that this sensible approach has taken so long to become a reality." He soothingly removed the objections of those who had previously worried about the negative attitudes of the agencies involved, by calling attention to the laborious process of getting the Department of Transportation and DOE together on the legislation. (In fact, the administration never became convinced to favor the legislation.) But McCormack went so far as to suggest there had been a "reconciliation" between DOT and DOE. It was all over in a few short minutes, with no negative voices raised, as the Brown amendment was quickly adopted.

PRESIDENT CARTER SIGNS THE BILL IN 1978

There was a little nail chewing because President Carter had vetoed the DOE authorization bill on account of the CRBR. Then it looked like the automotive R. & D. initiative might go down the tube also. But the section was preserved along with the non-CRBR sections of the DOE authorization bill, and finally signed by President Carter on February 25, 1978. Then the administration did not move to fund the bill.

Among the legislative measures on which the McCormack subcommittee held hearings, but were not passed by the 94th Congress, were the Industrial Energy Conservation Act of 1975, and the Energy Conservation in Buildings Act in 1976. During hearings on these two bills, the subcommittee received testimony on methods to promote energy conservation technologies, and the development and utilization of conservation by the Federal Government. Working in conjunction with the Public Buildings Subcommittee of the House Public Works Committee, the McCormack subcommittee examined a program to promote energy conservation in residential, commercial, and industrial buildings. This committee-sponsored legislation was then incorporated intact into the National Energy Act of 1978.

MCCORMACK SUBCOMMITTEE IN 1977

When the McCormack subcommittee was organized in 1977, its title was lengthened to become the "Subcommittee on Advanced

Energy Technologies and Energy Conservation Research, Development and Demonstration," with the following membership:

Democrats

Mike McCormack, Washington,
Chairman
 Richard L. Ottinger, New York
 Tom Harkin, Iowa
 Jerome A. Ambro, New York
 Robert (Bob) Krueger, Texas
 James J. Blanchard, Michigan
 Stephen L. Neal, North Carolina
 Ronnie G. Flippo, Alabama
 Dan Glickman, Kansas
 Anthony C. Beilenson, California
 Albert Gore, Jr., Tennessee
 Walter Flowers, Alabama
 George E. Brown, Jr., California
 Marilyn Lloyd, Tennessee
 Timothy E. Wirth, Colorado
 Wes Watkins, Oklahoma
 Ray Thornton, Arkansas
 Robert A. Young, Missouri

Republicans

Barry M. Goldwater, Jr., California
 Robert K. Dornan, California
 Larry Winn, Jr., Kansas
 Gary A. Myers, Pennsylvania
 Hamilton Fish, Jr., New York
 Carl D. Pursell, Michigan
 Eldon Rudd, Arizona
 Robert S. Walker, Pennsylvania

While the name got longer, the jurisdictional description in 1977 was shortened in the rules to cover:

All legislative and oversight matters related to research, development, and demonstration related to energy conservation technologies and of energy technologies utilizing solar and geothermal resources, and including space nuclear applications, basic energy sciences, and high energy physics.

Each year that ERDA and DOE sent up their budget request, the McCormack subcommittee recommended major increases in solar, geothermal, and conservation areas, as well as in the fields of environment and safety. Usually what happened on the House floor was that the House voted increases which even exceeded what the committee had approved. In general, the cast of characters each year was similar: Ottinger was the most insistently optimistic, always supporting investments far in excess of those favored by the administration, be it Republican or Democratic; McCormack, the author of the original 1974 solar R. & D., solar heating and cooling, and geothermal R. & D. acts, always favored increases, but invariably clashed with Ottinger on the latter's higher figures; and Goldwater, while a vocal supporter of all renewable resources, acted as the guardian of fiscal responsibility and usually wound up somewhat below McCormack's figure but above the administration figure. These generalizations, of course, oversimplify the frequent substantive arguments which enlivened every subcommittee meeting and floor debate. Ottinger always endorsed the

most enthusiastic appraisals of private industry and citizen groups, while McCormack and Goldwater both cautiously weighed the advice and opinions of those officials charged with implementing these programs in the executive branch.

In 1977, the figures looked like this when the committee took its bill to the House floor on September 13:

[Dollar amounts in millions]

Program operating expenses	President's budget in 1977	Committee increase	Total committee bill, 1977
Solar	\$298	\$74	\$372
Geothermal	88	38	126
Conservation	318	274	592

THE THREE VIEWPOINTS ON BUDGET FIGURES

Here is what the three leaders on the McCormack subcommittee had to say about the above figures:

MCCORMACK. I firmly believe that the authorization approved by the Committee on Science and Technology represents an aggressive and efficient pace for moving forward in solar energy, geothermal energy (and) energy conservation. * * * There is well-established evidence that there are serious limitations to the speed with which one can increase the size of research programs. Creating false expectations hurts us all and authorizing expenditures beyond those limits of efficient use hurts the credibility of the legislative process.

GOLDWATER. While I did not personally propose many of the increases made in the funding for individual subprograms, I feel that the committee has reached generally reasonable levels in most areas.

OTTINGER. Why isn't a greater push being made in this area? Why are we talking about it as a 21st-century operation? * * * All the information the public's been getting from ERDA is that this is a 21st-century operation without promise of being able to produce a significant amount of electricity.

During the amending process in 1977, Representative Paul E. Tsongas (Democrat of Massachusetts)—who later became a U.S. Senator—pushed through two amendments to increase funding for solar energy. The first added \$4.75 million for energy traineeships and went through without opposition. The second added \$38 million for one-year purchase of solar cells for use in Federal facilities and technology development in solar photovoltaics. (Solar photovoltaics, as opposed to solar heating and cooling, is the conversion of sunlight directly into electric energy.) Tsongas, who was supported by Ottinger and Gore, told the House that solar cells "cost too much because there is no market, and there is no market because they cost too much." He proposed to break the "vicious cycle" through a Federal buy to help

create a market. The buy was also to help momentum for a larger buy pending at that time in the National Energy Act. McCormack opposed the amendment on the grounds that it "would require the purchase of far more photovoltaic cells than could currently be produced," and he also felt to be effective it had to be a 5- to 10-year commitment. On a rollcall vote, the solar hawks won out by 227 to 179. Supporting Tsongas on the vote were the following committee members: Ambro, Blanchard, Blouin, Dodd, Downey, Roe, Scheuer, Ottinger, Harkin, Wirth, Neal, Walgren, Glickman, Beilenson, Gore, Frey, Fish, and Pursell. In conference, funding for the Tsongas amendment was cut in half.

THE SOLAR PHOTOVOLTAIC ENERGY BILL

Following a one-day oversight hearing on September 9, 1977 on photovoltaic conversion, the subcommittee tackled the subject in greater earnest in 1978. On February 8, McCormack and Goldwater introduced the Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978. The bill provided for a 10-year program to develop the necessary technology. It proposed to double the total production of photovoltaic systems each year for 10 years, so that by 1987 annual production would reach two million peak kilowatts of photovoltaic capacity, reducing the cost to \$1 per peak watt. In a memorandum to other members of the committee, they stated:

We are convinced that the time has come to develop a focused, goal-oriented solar photovoltaic energy program that is based on a cooperative effort between the Federal Government and private industry. * * * We estimate that the total Department of Energy funding will amount to \$1.5 billion over the next 10 years, a significant increase over the less ambitious year-by-year program otherwise to be carried out.

The memorandum also explained that the program "substantially reduced the risk we have run in the past of funding photovoltaic activity with no long-range plan, thus making it difficult to manage effectively." McCormack's subcommittee held hearings on the bill on April 11 and 12, 1978. In opening the hearings, he stated:

Until now photovoltaics has been considered to be an "exotic technology," possibly for the future, but too expensive to contribute to commercial energy production during this century. Recent developments, however, indicate that photovoltaic systems—which are both nonnuclear and nonfossil—offer the promise of an environmentally clean source of energy which may have applications in many segments of our society late in the century.

On June 6, the full committee met to mark up the solar photovoltaic bill. Wydler observed:

I would hope that we would objectively perform oversight on this program to see that the Government does not end up buying a lot of material and equipment that really is outdated, outmoded, not at the top of the art, and that we will judge this program on a very objective basis, to see that it is producing something of value for the country as it runs its course.

I know it is very difficult to argue against anything that says "solar" in it, but I feel that solar energy should be treated as any other source of energy, on an objective basis, to see that it is producing, for what cost, and who the heck wants it in the first place.

McCormack replied:

I want to say I completely agree with the gentleman. The concept of this bill in part is to rationalize a totally disorganized attempt to get into photovoltaic energy by a number of individual sources and committees in the Congress. There is no question about the fact that the photovoltaic industry is moving more rapidly now than we thought a year or two ago that it would be at this time.



Representative Barry M. Goldwater, Jr. (Republican of California) inspects a solar photovoltaic concentrator at Sandia Laboratories, New Mexico.

THE PRINTER WAS EXCITED

The committee reported the bill by a roll call vote of 33-0, and it was considered on the House floor under suspension of the rules on June 28. When the debate opened, McCormack received unanimous consent to change a word "exciting" in the bill, which he said should read "existing." McCormack explained:

This is strictly a printing error. I think that the printer was excited about the bill.

In presenting the bill on the floor, McCormack made a practical demonstration to the Members of the House, showing how a lighted bulb (representing the Sun) when focused on photovoltaic cells could run a tiny one-hundredth of a watt motor and turn a propeller. He

could not resist pointing out that the total production of photovoltaic cells was the equivalent of about three-hundredths of 1 percent of one nuclear powerplant. Speaking in support of the bill were Fuqua, Goldwater, Fish, Pursell, Walker, and Dornan, as well as a number of noncommittee members. Representative Chalmers P. Wylie (Republican of Ohio) told the House:

The solar photovoltaic concept draws attention to the serious problem the Nation faces, posed by our depleting energy resources. * * *

We who live in Ohio are perhaps a little more sensitive to this problem than those who live in other areas. For the past two years we have suffered from painful glimpses at a frozen crystal ball. The winter of 1977 brought a natural gas shortage that closed our industry, business, and schools. This winter's coal strike brought the same threat from a different direction.

OTTINGER, THE RINGLEADER

Even though his name was not prominently associated with the final legislation, and the mutual accolades which accompanied it, one committee member could take private satisfaction from the fruition of his efforts. Ottinger had been the ringleader of extensive efforts to get ERDA and DOE to realize that industry was far ahead of the Federal Government in moving forward with photovoltaics. Time after time, he forcefully called attention to the work which was being done by specific industries in various parts of the country, as evidence that the DOE should be moving faster. As a pioneer and advanced thinker, Ottinger was at times labelled as an "agitator" or "bomb thrower" by some of his colleagues. On the day the bill was being debated, Ottinger remarked:

In the past the photovoltaic program has not, in my opinion, been taken with an adequate degree of seriousness.

This was a mild understatement. There are times when majorities in both the Congress and the general public treat unkindly those who are too right too soon. It was Ottinger's custom to plant his flag higher up on the mountain when a majority caught up with him. Yet it usually took others to consolidate the gains.

ANOTHER FEATHER IN COMMITTEE'S CAP

When the solar photovoltaic bill was passed in the House, it received topheavy support, 385-14. Scheuer was the only committee member to vote against the bill. The bill passed the Senate on October 10. At this point the committee faced the question of whether to disagree with the Senate amendments and ask for a conference committee meeting, or accept the Senate amendments and send the bill

to the White House. The lateness of the session certainly influenced the decision to send the bill to the President, where it was signed into law on November 4, 1978.

Goldwater told the House when the bill returned from the Senate that he was pleased with the outcome:

Although the bill originally passed by the House would have provided what I feel would have been a more focused program, I am pleased to see that the other body has provided some beneficial refinements to the program established by this legislation.* * * This legislation represents an outstanding example of a case where both the majority and minority sides of Congress have worked together in forging a legislative mandate to help direct our Nation's energy efforts.

McCormack was not quite as optimistic. He readily agreed that the best course of action was to accept the Senate amendments and send the bill to the President. But he made no secret of his unhappiness with the Senate amendments. He charged that the Senate had altered the tone of the bill, implying that photovoltaic electricity might or would be competitive with conventional electricity within a decade. McCormack told the House on October 13, 1978:

While we would be most happy with such a development, honesty demands that it is not realistic to expect it; and misleading to hold it out as a possibility to the people of this country or the world.

McCormack labelled other optimistic findings by the Senate as "excessive and unrealistic." He denied that foreign nations were using this new form of energy competitively, saying that "this is a gross exaggeration." He also expressed disappointment with the 10 percent small business set-aside in the Senate bill, which he felt "may become difficult in the later years of the program." But the House accepted the Senate changes, and the President signed the legislation on November 4, 1978.

McCormack told the House that his subcommittee of the Science Committee would hold oversight hearings on solar photovoltaic energy during 1979. In January 1979, a realignment of jurisdictions transferred the solar area to Ottinger, whose subcommittee held both DOE authorization and oversight hearings during the spring and early summer of 1979.

OVERSIGHT ON SOLAR HEATING AND COOLING

During the entire period, the subcommittee followed very closely developments in carrying out the Solar Heating and Cooling Demonstration Act of 1974. As the 5-year demonstration program passed the halfway mark, the subcommittee held an oversight hearing on November 3, 1977. At that time, nearly all of the residential projects—over 95 percent—were for heating, while about 75 percent of the commercial projects were also for heating purposes.

Once again, in 1978, the subcommittee and full committee endorsed sharp increases in solar, geothermal, and conservation R. & D., with additional emphasis on bioconversion of organic waste and other materials to energy.

When Secretary Schlesinger appeared before the full committee to present his first DOE budget on January 25, 1978, many members quizzed him sharply on proposed reductions in administration support for solar energy. Frey led off by noting that the solar budget request had actually declined from \$389 million in the prior year to \$373 million in 1978:

Looking at the total solar budget, there just really doesn't seem to be any push to it * * *. My time is up, but I hope it isn't up for solar energy.

Harkin, Gore, Wirth, and other committee members took up the cry for more emphasis in the solar area. When the McCormack subcommittee assembled for its more intensive review of the administration proposals in 1978, the subcommittee criticisms were sharper and more insistent. Goldwater, who had always cautioned a careful and fiscally responsible approach, expressed his disappointment with the solar energy proposals:

The solar budget we have been provided with contains little in the way of new issues, and brings into question our commitment to make solar energy a reality * * *. Similarly, I am distressed with the maneuvering underway with regard to the Solar Energy Research Institute * * *. The watchword seems to be defer, study and delay. We are not going to solve our energy problems with that kind of approach.

Gore commented:

Congress is far in advance of what the administration is willing to propose * * *. This budget, without stating it too strongly, evidences a tragic lack of vision and a lack of leadership.

Ottinger accused DOE of dragging its feet in the solar area:

People in the research labs and people in the universities and the people in independent industry are really moving on the solar front a good deal faster. I don't have the feeling that DOE is even keeping up with what is going on, on the outside, to say nothing of pushing the industry.

Wirth noted that in the face of the sharp sense of urgency in the committee, and the obvious impatience to get more done, the cut in solar technology was "a real disgrace to this administration."

WYDLER CONDEMNS SOLARMANIA

When it came time to mark up the DOE authorization bill in full committee on March 14, 1978, Wydler had replaced Goldwater as the voice of caution on solar energy:

I hate to be the one that throws cold water on solar energy, and I do believe that it will provide some measure of energy for our Nation in the years ahead, and

I'm not against it. But I really feel we tend to get into a state of mind with solar energy at the current time which is solarmania. We look at it as almost a solution to all of our energy problems. I know people write me like it is, and I don't know where they get that idea.

McCormack, although he supported large increases in the solar budget, responded to Wydler:

I think the concerns the gentleman from New York is expressing are valid concerns * * *. I agree with the gentleman that we are in a perilous situation with a sort of a solar religion that permeates some people in this country and some members of the press and unfortunately some Members of Congress. They do believe that solar energy will solve this Nation's energy problems in the foreseeable future. Even with these aggressive programs that we have set out, however, I think it would be extremely optimistic to project that we can produce 3 to 5 percent of this Nation's energy requirements by the year 2000 (with solar energy).

Gore immediately answered:

I would like to see it very much larger than it is, because I feel that the contribution which can be made by solar energy is much larger than the feelings of the chairman, whose views I certainly respect * * *. Some of us tried to get a lot more money for solar research and development but the chairman and the staff held the line on it.

Frey made a mild rejoinder:

I think more could be done in the solar area. We have had testimony year after year to the effect that no administration has put the emphasis on it that it should receive. I also disagree slightly with the gentleman from Washington, in that I think with a little more emphasis we could have more results in the near-term.

The debate over DOE emphasis in solar R. & D. was repeated in many other areas, as Members attempted to instill a greater sense of urgency into DOE's approach to energy R. & D. For example, Glickman in the 1978 hearings labeled the administration thinking on biomass and alcohol fuels as "disastrously conservative." Blanchard scored DOE for assigning such an inadequately small staff to bioconversion.

COMMITTEE INCREASES IN 1978

When the committee took the DOE authorization bill to the floor on July 14, 1978, as was customary there were a number of areas where additional emphasis was placed beyond the administration requests:

[Dollar amounts in millions]

Program operating expenses	President's budget in 1978	Committee increase	Total committee bill, 1978
Solar.....	\$291.8	\$101.5	\$393.3
Geothermal ..	129.7	16.0	145.7
Conservation ..	324.1	85.8	409.9

Among the amendments added by committee members in 1978 were the following:

- Wydler amendment to add \$5.4 million to the energy conservation area, for R. & D. to improve home heating by oil. Wydler called this his "real world" amendment, that "comes to grips with the real world of energy use, and that's the world in which people burn oil."
- Fish amendments to place additional emphasis on "low head" hydroelectric power development, and R. & D. to advance underground transmission lines.
- Gammage amendment to add \$5 million for gas-fired heat pump acceleration.
- Thornton amendment to increase authorization for Energy Extension Service from \$25 to \$35 million.

There was a difference of opinion within the committee on the emphasis to be placed on various features of the geothermal R. & D. program. The committee voted an overall increase in most aspects, but a \$3 million decrease in the hot dry rock area, viewing too much of this activity as devoted to exploration—the job of the U.S. Geological Survey. But Lujan told the House on July 14:

I am not satisfied with the level of funding for hot dry rock technology in geothermal energy.

During the House debate, Goldwater released another blast at DOE. He proclaimed that the administration's energy budget request in 1978 "at best is lackluster and at worst is a national disgrace." The committee forcefully set forth a far more aggressive energy R. & D. package each year. And its recommendations were based on long and careful study, public hearings, field trips, and an effort to assess priorities and the urgency of the situation.

SPECIAL INQUIRIES BY MCCORMACK SUBCOMMITTEE

Among the special inquiries undertaken by the McCormack subcommittee were the following:

- Hearings in April 1977 on "energy demand, conservation potential and probable lifestyle changes." The subcommittee examined projections on growth rates, conservation possibilities, and how they would affect life style.
- Hearings on December 12, 1977, on "the many lives of re-refined oil." Watkins chaired the hearings held at Seminole Junior College, Seminole, Okla. The objective was to determine the potential of re-refining technology, as well as better disposal methods to meet antipollution standards.

- Hearings on June 7-8, 1978, on "earth resources and drilling technology." The subcommittee assembled information on the relation between drilling technology and the development of underground energy resources—geothermal, petroleum, methane, and uranium. The subcommittee also examined the issues of skilled manpower availability and exploration and drilling priorities.
- Three days of hearings in July 1978 on gasohol—the production and use of alcohol, derived from grains, wood and other forms of biomass, for use as motor vehicle fuel. The subcommittee went into questions of supply, economics, and energy efficiency.
- Field hearings on bioconversion at Brookhaven National Laboratory (wood and municipal solid waste) and in Denver, Colo. (generation of methane from animal wastes and bioconversion of grains and agricultural wastes), during July and August 1978.
- Hearing on "passive solar energy programs and plans," held on September 19, 1978. By careful architectural design (such as south-facing glass) solar heat gains can be maximized in winter, and proper building design can also increase natural cooling in summer. Since these applications do not rely on any outside source of energy, the term "passive" is used. The subcommittee examined the speed with which the building industry could introduce this technology, along with an improved public understanding of the technology. Harkin and Gore took the lead in requesting this subcommittee hearing.
- Three significant workshops of a foresight nature were held by the subcommittee in 1978, and their results published in 1979: (1) Nontechnological (societal) aspects of hydrogen energy systems. Results of a workshop held by the National Bureau of Standards at Reston, Va.; (2) CRS workshop on energy use in cities; and (3) CRS workshop on economic effects of energy conservation.

SOLAR SATELLITE POWER SYSTEM

With strong and interested support from the committee, NASA had for several years been investigating the possibilities and implications of solar satellite power, beamed to transmission stations on Earth. Both ERDA and the DOE took an interest in these studies, and jointly assisted in carrying them forward.

On May 24, 1973, Symington's Subcommittee on Space Science and Applications had an historic joint hearing with McCormack's

new Subcommittee on Energy. Energy from outer space was the theme of the session over which Symington presided. He opened the hearing with this comment:

We have assembled a panel of three experts to discuss with us how satellites and microwaves might be utilized to transmit or generate energy.

He then introduced Dr. Peter Glaser, vice president and head of engineering sciences of Arthur D. Little, Inc., and noted:

He is a pioneer in discussing the concept of a satellite solar power station and has recently directed a feasibility study of this concept for NASA with personnel drawn from a four-company team.

Dr. Krafft Ehrlicke, chief science adviser for Rockwell International Corp., and Dr. Klaus P. Heiss, director of advanced technology economics at Mathematica in Princeton, N.J., rounded out the panel. Dr. Glaser in particular talked of a satellite power system which could be developed in conjunction with the Space Shuttle. At that time, he very modestly set a price tag for a 10-year technology verification program at several hundred million to half a billion dollars—a figure which dramatically increased as time went on. Brown immediately grasped one of the problems, and observed:

I recognize that we don't have too much information on the environmental impact of this, and that this is one of the areas we need further information on.

On February 20, 1976, in joint hearings of Fuqua's Space Science and Applications Subcommittee and the McCormack subcommittee, Dr. Glaser made a return presentation which was somewhat more elaborate. He estimated the satellite itself would cost \$20 billion, it would take about \$24 billion to develop the space transportation system, and that building 60 solar satellite power stations over the period 1995 to 2014 would defray the cost of the investment in development.

WE DON'T KNOW WHO PAUL IS

Staggered by the size of the investment, Goldwater wondered whether \$50 billion might not divert a big investment from the array of other multi-billion-dollar energy projects needed to meet the Nation's energy needs by the year 2000. As Goldwater put it:

Are we not robbing Peter to pay Paul, and we do not know even who Paul is? Dr. Glaser handled that one by stating that the SSPS should be considered as one option which this country could weigh, among others.

The concept received a big boost from the committee in 1978; three days of hearings were arranged, jointly between the Fuqua and McCormack subcommittees on a bill principally sponsored by Flippo. The Flippo bill, which was cosponsored by 21 other com-

mittee members, established a DOE program office to manage the SSPS, assigned roles for both DOE and NASA, and authorized \$25 million the first year. The concept was defined as placing into orbit a series of satellites collecting energy from the Sun, transforming this energy into microwaves, and beaming the power to locations on Earth where it would be reconverted into electrical energy and beamed directly to ground power stations.

In announcing the hearings, Fuqua noted that the idea has been treated much like a stepchild by Department of Energy officials. He decried the fact that the paper studies had been insufficient to answer questions on technical and economic feasibility and environmental concerns. Flippo told the opening hearing that solar power satellites could be demonstrated, using the Space Shuttle, for a cost of between \$175 to \$350 million over a 5-to-6 year period. In endorsing the approach taken by the bill, McCormack stated:

To date, the present DOE/NASA study program has not uncovered any problem that appears to be insurmountable and those that have been identified require technology verification for resolution.

Winn gave the committee some of the hard-nosed alternatives in extremes of claims and counter-claims of the supporters and opponents of the SSPS. He said the most extreme advocates envisioned a space colony which could generate nearly all the energy needs on Earth. Winn said the strong opponents felt this way:

The vast thought of microwaving energy to the Earth makes people believe they will be walking around in a giant microwave oven. The passengers in airplanes flying through the beam will become instant "crispy critters." And if this isn't bad enough, the huge industrialists are going to be controlling this centralized power system and financially ripping off the public.

In his own view, the truth was somewhere in between these two extremes. Winn asked the subcommittees to bear in mind that the SSPS could produce only 40 percent of U.S. energy needs in the year 2025; that the earliest projection for a commercial satellite was 1995; and that any ground-based solar power system could provide only a fraction of the power requirements of the average American home.

FLIPPO CARRIES THE BALL

During the hearings, various committee members pushed both DOE and NASA to instill greater urgency into the SSPS program. Flippo remarked:

I believe that the members of the committee have expressed time and time again that we want to get a go or no-go decision on SSPS as rapidly as possible. *** I am concerned that the Department of Energy's present plans will never get us to a decision point.

Fuqua suggested that, as in the Apollo program, the SSPS should proceed along several parallel lines simultaneously, instead of in serial form. He chided NASA Deputy Administrator Dr. Alan Lovelace for an unenthusiastic statement on SSPS:

If I had some Tabasco, I would put it on there to make it taste a little better. *** I realize that there is another agency in town, Dr. Lovelace, besides NASA. And that is the faceless people at OMB. It appears to me that they have put bridles on both NASA and DOE.

In presenting the bill for approval by the full committee on May 3, 1978—Sun Day—Fuqua emphasized that the bill represented no commitment to future commercialization, but was designed to move forward the testing and technology of this inexhaustible source of energy. McCormack labelled the effort another example of the Science Committee taking the lead in introducing legislation for solar research, development and demonstration which is both aggressive and responsible.

While strongly supporting the bill, Wydler told the committee:

As you know, Mr. Chairman, I am one of the minority of the Congress who feels that solarmania has gripped the land and the Congress, and that this phenomenon will run its course, as most of these things do. But in the meantime, I hope we don't do a great deal of damage to the Treasury or to some of the proposals that are coming forth in the solar field by overselling them to the people and overfunding them so that the money is wasted.

Brown raised a question as to whether the bill placed an over-concentration on the SSPS to the detriment of other near-Earth missions "to sense what is going on in and, at the other end, to turn the sensors around and sense what is going on in Space." Brown expanded on this thought in an "Additional View" appended to the committee report, stating:

By accepting this program now we may be limiting our future for the next thirty to fifty years in space. The program could totally devour all the effort, capital, and technology available to move forward in near space.

OTTINGER OPPOSES THE SSPS

Ottinger, who wrote a scathing minority report, emerged as the major opponent of the bill. He charged that the aerospace industry was foisting a \$40 to \$80 billion R. & D. program on DOE and NASA before preliminary studies had been completed. He pointed out that the hearings had called no major critics to testify, and that the danger

of microwaves was devastating to human beings. Ottinger warned against the military implications of developing a destructive microwave beam.

When the bill was debated on the House floor on June 22, 1978, Ottinger was the only committee member to speak against it. He stated:

This program is a creature of the space industry conceived to keep its nose in the Federal trough forever.

Wylder needled him with this observation:

The gentleman is against nuclear energy. The gentleman has always been selling the people on the idea of using solar power for energy. Now, here is one of the ways we can do it, and now when we get it on the floor the gentleman is on his feet opposing this as well. What are we going to use?

Ottinger responded:

I consider this a real perversion of solar energy.

He added that the rockets to launch the satellites would burn holes in the ionosphere, permitting increased solar radiation. Flippo rebutted that "this bill does not attempt to hide, to disguise, to ignore, or to minimize the environmental issues associated with the SSPS concept." He indicated that the bill established an independent review mechanism to assess environmental, biological, and ecological issues.

Fish rallied some of the environmentalists to support the bill because of his own environmental record. "I rise as an unreconstructed solar power advocate and I rise in support," Fish started off. He acknowledged there were possible drawbacks, but advised:

I believe that we must still investigate these approaches and determine the extent of the barriers to their implementation if we are to formulate a rational energy policy.

THE SSPS BILL PASSES HOUSE IN 1978

The bill passed by the margin of 267 to 96, with Ottinger, Blouin, Brown, and Downey the only committee members in opposition. The Senate, however, failed to act on the bill in 1978.

In 1977, the Congress appropriated only \$4 million for the SSPS, which was divided between DOE with \$2.3 million and NASA, \$1.7 million. In reviewing the cooperative NASA-DOE energy programs, the Fuqua Subcommittee on Space Science and Applications on February 8, 1978 touched on the work being carried forward in the SSPS. R. D. Ginter, NASA's Assistant Associate Administrator for Energy

Programs, commented that the Flippo bill was to his liking because "it did not tell us to go get something done." This prompted Fuqua to observe: "Mr. Flippo is a very crafty legislator." This colloquy then ensued with Bennett Miller of DOE's Solar and Geothermal Programs:

Mr. FUQUA. It's come to my attention that in DOE there is only one person assigned to solar satellite power, and that he has other duties as well. Is that an accurate reflection?

Mr. MILLER. The solar satellite power program is being handled now by a branch chief in the Division of Solar Technology. Indeed, he does have other duties and there is only that one individual. * * *

Mr. FUQUA. How many employees do you have in DOE?

Mr. MILLER. About 19,000, I think.

Mr. FUQUA. That's about the level of effort that we figured it was getting. I hope that that effort will improve. I've never seen any agency of the Federal Government have one man do one thing. I've just never seen it. He had to have an assistant and then a few other people to help support that.

Mr. MILLER. Maybe it's a sign of good management.

Mr. FUQUA. And here it's half a man. He must be a rather talented individual. I would hope that there would be more effort being put forth in DOE in solar power satellite efforts than just a partial man, or maybe calling in a few to fill in.

Mr. GORE. Mr. Chairman, maybe we could call him the \$2.3 million man. [Laughter.]

In March 1979, the Subcommittee on Space Science and Applications on its own held three hearings on the SSPS bill, without joining with an energy subcommittee. Engineering societies, environmental groups, and DOE and NASA testified. The 1979 bill placed less emphasis on the demonstration aspects. Although Ottinger's Energy Development and Applications Subcommittee held several hearings on the SSPS bill, it was Fuqua's subcommittee which assumed legislative responsibility for the SSPS bill in 1979.

NO COMMITMENT FOR COMMERCIALIZATION

In his subcommittee report, Fuqua commented:

I want to emphasize that there is no commitment to the construction of a commercial demonstration solar power satellite. In addition, there will be an annual authorization which will assure the Congress a full annual review of the progress and resolution of issues.



Representative Howard Wolpe (Democrat of Michigan).



Representative Beryl Anthony, Jr. (Democrat of Arkansas).

When the Flippo bill came up for consideration by the full committee on May 10, 1979, Wolpe offered two amendments to delete all references to "development" (an amendment recommended by DOE), and to reduce the authorization from \$25 million to \$8 million—which would amount to a doubling of the authorization then available for DOE and NASA. Wolpe argued:

The same dollars that are being proposed to be spent in this area and would be spent in the future on the development of related technology, in my judgment, would be much more wisely invested in the development of appropriate conservation technology and the development of small-scale land-based solar technology.

Wolpe, supported by Pease, lined up against Wydler, Winn, and Flippo, who argued that \$25 million was a small investment contrasted with the hundreds of millions being spent for other forms of solar energy and nuclear fusion. The Wolpe amendments were defeated, 27-6 and 25-7, and the committee favorably reported the Flippo bill on May 10, 1979. The House passed the bill on November 16, 1979, 201-146.

During 1978, the McCormack subcommittee published three significant reports which had been compiled by the Science Policy Research Division of the Library of Congress, entitled:

- "The Role of the National Energy Laboratories in ERDA and Department of Energy Operations: Retrospect and Prospect," January 1978;
- "Energy from the Ocean," April 1978; and
- "Energy from Geothermal Resources," June 1978.

THE 1979 FIGHT OVER ENERGY JURISDICTIONS

At the committee Democratic caucus on February 1, 1979, the issue of energy subcommittee jurisdictions was up for grabs. Out of some 10-15 different options for dividing the two energy subcommittees, the organization meeting boiled these down to three—one proposed by McCormack, Brown and Roe; a second proposed by Ottinger and several others; and a third compromise suggested by Fuqua. McCormack argued that relationships with the Department of Energy would be simpler if the subcommittees were organized parallel to the DOE organization and budgetary divisions, and also that the heirs apparent to the two energy subcommittee chairmanships (McCormack and Brown) agreed on the relative jurisdictions. Unanticipated by McCormack, Brown chose instead to chair the Science, Research and Technology Subcommittee. The plan suggested by McCormack split solar programs by placing energy production technologies (like solar electric) in one energy subcommittee and solar technologies—like heating and cooling—in a second energy subcommittee. Fossil and energy conservation went with applications, while geothermal, nuclear, and electric energy systems went to a subcommittee presumably to be chaired by McCormack. Ottinger commented:

The problem I have with the division proposed by Mr. McCormack is that it loads up the Energy II Committee with most of the energy systems in which all of us are interested. *** I do think it is terribly important that the work load of the two energy committees be fairly divided, so that both of the subcommittees will be of equal importance, interest and attraction.

Gore pointed out that the committee would be foolish to follow DOE's organization since DOE "may be the most disorganized part of the executive branch. I would hesitate to see us compound the mistakes that they have made over there." Blanchard added: "I hate to see anyone vote for a plan based on what DOE has done. I know for a fact that the organization over there was developed much for political and internal reasons."

The compromise proposal advanced by Fuqua split fission and fusion, but had the advantage of allocating fairly even dollar authori-

zation figures to the two energy subcommittees. Fuqua suggested that the division of energy jurisdictions be settled in a democratic fashion, voting on all three options, dropping the option having the lowest vote on the first go-around.

THE VOTE ON JURISDICTIONS

A hot, close battle then took place on the vote which came out on the first round as follows: McCormack option, 8 votes; Ottinger option, 7 votes; Fuqua option, 7 votes.

On a run-off between the Ottinger and Fuqua options, the vote came out 13 to 11 in favor of the Ottinger option. Then, when the next show of hands occurred to decide between the McCormack and Ottinger plans, the committee was deadlocked, 12 to 12. On a roll call, the Ottinger jurisdictional arrangement finally prevailed by a narrow 14 to 11 vote.

The effect of all this maneuvering was to realign the energy subcommittees, effective in 1979, to give Ottinger's subcommittee dominion over a majority of the programs once under the McCormack subcommittee, including all solar, conservation, biomass, and advanced energy technology, plus fossil energy. McCormack's subcommittee at the beginning of 1979 retained jurisdiction over electric energy systems and energy storage, geothermal and hydroelectric energy systems, basic energy sciences, high energy, and nuclear physics, as well as nuclear fission and fusion.

SECRETARY SCHLESINGER AND THE 1979 HEARINGS

Fuqua opened the 1979 hearings, with Secretary Schlesinger as the lead-off witness, commenting on several advanced energy technologies. Fuqua noted:

In the solar area, we have gone from a budget of less than \$1 million in the early 1970's to a request of \$650 million for fiscal year 1980. We must be careful to insure that we are getting a reasonable return for our dollars and that any future increases are based firmly on technological merit rather than political popularity.

Wydler's opening comments were also designed to caution a more careful allocation of funds to solar R. & D.:

Unfortunately, nuclear has suffered major cuts for fiscal year 1980. It appears that solar activities have received these additional funds. The progress of solar energy development has been uneven at best and nonexistent in some areas. Certain programs have slipped more than one year and other programs have been revised so drastically that progress is untraceable. I think that one great service that this committee can perform is to authorize solar funds based on what has been really gotten for the dollar.

“WHAT ON EARTH ARE YOU WAITING FOR?”

Brown expressed his unhappiness with the budget presented in 1979 in its treatment of the Energy Extension Service, the program of small grants under \$50,000 for energy programs, and the automobile propulsion program. Ottinger, never bashful about expressing sharp criticisms of witnesses, assailed Schlesinger for DOE's slowness in moving forward in the conservation area:

What on Earth are you waiting for? * * * Why are we waiting to institute the kinds of conservation programs that you are discussing or considering far off in the future? * * * We either have a crisis or we don't. We are not acting as if we do. * * * On this committee, I think we ought to be choosing some priorities and really pushing them much faster.

Blanchard was also critical:

I am still waiting for an aggressive energy program. * * * What is your position on the domestic policy review, on this decision that has to be made regarding our commitment to solar energy? What type of posture on solar energy?

To Ottinger, Schlesinger responded that the tax credits voted by Congress to encourage better home insulation and use of solar heating were additionally useful achievements in conservation. He mentioned that the dollar-for-dollar increase in Gross National Product and energy consumption had been reduced to 70 cents of energy consumption for every dollar increase in GNP. Regarding the future of solar energy, Schlesinger responded:

I would say, generally speaking, I have urged strong support for solar energy. I have not been favorable to the establishment of the prescribed target for some particular year until some of the uncertainties regarding the technologies are resolved so that we would have a better understanding of the effectiveness. I think that as we develop these technologies solar energy can take on an increasing share of the total energy budget. * * * There is not a consensus in the country or in the committee regarding future energy sources.

Gore also emphasized: “I just don't see the sense of urgency.” He pointed to budget cuts in energy conservation, industrial cogeneration, urban waste conversion grants, and testing of gasohol.

FUTURE PROSPECTS FOR SOLAR ENERGY

During the question period, Wydler again challenged Schlesinger on solar energy. He pointed to a recent review by Dr. Frank Press, Director of the Office of Science and Technology Policy, which had concluded that it would be several decades before solar energy would make any significant contribution to electrical energy production. Wydler asked:

It says, don't bank too much on solar energy for any significant contribution. Yet, we are making a very sustained drive to spend a lot more money in that area. Now, those two things are somewhat inconsistent.

Schlesinger shot back:

I don't think they are inconsistent. We certainly are not going to get much energy from the breeder reactor over the next 20 years. I think that you are still a supporter of the breeder reactor.

SOLAR ENERGY PROGRESS IN 1979

Following 10 days of hearings at the end of February and early March 1979, the Ottinger subcommittee reported out its section of H.R. 3000, the DOE authorization bill. During the hearings, Ottinger and Gore took the DOE to task for ignoring the congressional mandate for a Federal photovoltaic buy program. In April 1979, the full committee approved a solar increase over the President's budget, as follows:

[Dollar amounts in millions]

	President's budget in 1979 (operating expenses)	Committee increase	Total
Amount.....	\$417.4	\$9.1	\$426.8

The committee increased funding for development of components and prototypes for solar heating and cooling. Also, an amendment to the DOE authorization bill extended the Solar Heating and Cooling Demonstration Act of 1974. The committee increases made possible final assembly and field testing work on several residential and industrial cooling systems.

The committee funding enabled progress toward the President's goal of installing solar systems in 2.5 million homes by 1985.

In the photovoltaics area, the committee voted a \$25 million increase to authorize additional testing of the generation of electricity from sunlight. Some decreases in operating expenses in other solar categories were occasioned by shifting funds to construction accounts.

On June 14, 1979, Ottinger's subcommittee scheduled joint hearings with the Commerce Committee's Subcommittee on Energy and Power to assess the status of the domestic policy review of solar energy which President Carter had initiated in May 1978. Ottinger noted that "the domestic policy review, which involved a total of 29 Federal agencies and a good deal of public participation, was completed 7 months ago and submitted to the President for a policy decision." As the June 14 hearings were held six days before the Presidential announcement of a new policy on solar energy, there was a good deal of criticism by committee members of the lack of action by the administration.

"The country cannot afford more waiting for a solar policy," Ottinger declared, pointing out that Congress had been way ahead of the administration in its actions in the area. On the other hand, Wydler stated that in five years "we have sunk over a billion dollars into solar and commercialization. It is about time we start to look to see if we are getting anything for our money * * *. I am also concerned as to whether our large annual increases for solar have led to an orderly, expanded program, which is what we wanted, or a mixture of chaos and solar 'pork,' as some have charged." Wydler cited the example of the Grumman Corp. in his area, which had suffered from "all of the discussions we had about tax credits for solar heating devices." Wydler stated:

When those discussions started, the bottom fell out of their market and a company which was making good progress in commercial sales of solar heating devices found that that market had disappeared. While we meant well, as a practical matter what we did do was to hurt the sound development of solar energy in our Nation.

20 PERCENT SOLAR BY 2000

The President's June 20, 1979, plan to produce by the year 2000 20 percent of all energy by solar means received differing reactions from committee members. Fuqua hailed the initiative as a "necessary move to focus attention on the alternatives available and an expression of leadership in the energy field to which the public can rally." Gore indicated:

While I am encouraged by the leadership which has finally been exhibited by the President, my enthusiasm is somewhat tempered by the delay until fiscal year 1981 for an increase in the budgetary commitment to solar energy and the similar delay in funding the Solar Development Bank.

Fish remarked:

Unfortunately, I find nothing new in the President's remarks. Left out was a call for any additional solar R. & D. While a goal was stated, a firm commitment was lacking. No program was spelled out to attain the goal.

Ottinger introduced a resolution, with a number of cosponsors, to make solar residential tax credits retroactive, in order to avoid having people delay their initiative until sometime in the future.

Wydler suggested that the congressional review of solar R. & D. was not as rigorous as for other emerging energy technologies. He stated that Congress was not requiring DOE to designate specific milestones every year for solar energy. Wydler added that the Presidential goal of 20 percent solar energy by the year 2000 was "approximately equal to the amount of energy we are now getting from coal, nuclear, solar, geothermal, hydroelectric, and biomass energy sources combined. This is no small feat and we are certainly not going to be

able to do it with a Government program that has trouble telling Congress what it is going to achieve in the year 1980, let alone 2000."

Wolpe and Gore noted that billions of dollars in Federal subsidies in the past and currently were being doled out to other forms of nuclear and fossil energy, justifying further subsidies to solar energy.

The newly-appointed Director of OTA, Dr. John H. Gibbons, generally supported the President's plan, with some reservations:

I would also like to support the notion of the establishment of a specific goal for solar energy. *** We are not convinced yet that the program that is outlined by the administration will enable the goal to be attained in the time allowed.

Blanchard listed fear by the administration and the Congress as the greatest obstacle to placing more emphasis on solar energy:

Fear that there may be some risk, fear that we will spend some money, fear that we will waste some money, fear that we will step on some toes, fear that some people will make money and fear that in the long run we will look foolish.

For Ottinger, long the most outspoken exponent of solar energy, his reaction was:

While I would obviously like to have seen the President's message more detailed and more aggressive, I am happy that it is a beginning. * * * The \$5 or \$6 billion in the Energy Department's civilian budget seem increasingly to get lost in layer upon layer of consultants. Real people out there are getting very little help at all. *** My displeasure with centralized solar systems is extreme—mainly because they are predicated on retaining, at almost any astronomical cost, a commitment to big, centralized energy systems and keeping solar at its best away from real people with real needs to heat and light their homes.

PULLING THE SOLAR PIECES TOGETHER

Ottinger's solution to the layers of authority was not, as proposed by the President, a "coordinating Council" for solar energy, but instead he recommended:

We ought to give the Assistant Secretary for Solar Energy the responsibility of pulling the pieces together and be answerable for the program.

After Charles W. Duncan, Jr. took office as Secretary of Energy on August 24, 1979, Ottinger's advice was followed by the consolidation of all Federal solar responsibilities into a single Assistant Secretary for Conservation and Solar Energy. The President's Domestic Policy Review on Solar Energy identified wind energy as having the largest potential of any of the solar electric technologies to provide significant amounts of electricity by the end of the century. Through the leadership of the Ottinger subcommittee, the House on December 4, 1979 passed by a vote of 383-23 "The Wind Energy Systems Research, Development, and Demonstration Act of 1979." The bill authorized \$100 million to start an R. & D. program on wind energy utilization.

With both words and deeds, Ottinger continued to stress the necessity for more DOE emphasis in the conservation area. As the DOE authorization hearings got under way on February 21, 1979, Ottinger told DOE witnesses:

We must do more. The report of the Council on Environmental Quality, released yesterday, along with the studies upon which it was based, indicates that the Nation can achieve meaningful conservation results, and do that generally with a much smaller investment than the equivalent gains in fuel production would cost. * * * The beauty of embarking on such a conservation program is that the return on our initial investment is clearly substantial, and with that payback we limit the impact on inflation as well. Indeed, it is clear that the conservation investment might be as little as 10 to 50 percent that of investment in new energy supplies.

CONSERVATION PROGRESS IN 1979

Dollar amounts in millions

	President's budget in 1979 (operating expenses)	Committee increase	Total
Amount	\$332	\$91.95	\$423.95

The Ottinger subcommittee voted a number of hefty increases in the conservation R. & D. program, all of which were ratified by the full committee. These included increases in municipal waste-to-energy grants and loan guarantees, fuel cell demonstration, industrial process efficiency and industrial cogeneration, alternative fuel utilization for transportation (such as gasohol), appropriate technology and the Energy Extension Service.

The appropriate technology small grants program sparked a fight in the full committee, after Ottinger's subcommittee had recommended a \$15 million increase which Walker attempted to cut back to the budgeted request. Walker argued:

It is difficult for me to support the irresponsible funding level authorized in light of our Nation's current economic situation. * * * By adding \$15 million to this fledgling program, we are almost tripling the size of a program that cannot handle these funds. * * * Another concern I have is with regard for the need to eliminate duplication of effort among the DOE programs. This is clearly a problem with the Appropriate Technology program, which funds several solar and conservation activities that are already being done in the solar technology and conservation program area.

Ottinger rebutted:

This program I think is one of the most exciting programs we have. * * * The purpose of the substantial expansion of this program is to permit us to go nationwide on the very successful pilot program that was commenced in California.

Brown noted the thousands of applications, far exceeding the available funding. Glickman added:

It seems as though everything we do in this committee is based on high intensity of capital—the Boeings, the United Technology's benefit, but this deals with the innovative spirit of what I call individual America, particularly rural areas.

MRS. CARTER TESTIFIES ON THE MALL

On April 30, 1979, Ottinger's subcommittee teamed up with the Senate Subcommittee on Energy Conservation and Supply to hold appropriate technology hearings on the Mall near the Lincoln Memorial Reflecting Pool. It was an occasion which proved to be historic, as the joint hearings opened on a balmy spring morning in what Ottinger said may well be the first ever held in a tent. Huge groups of visitors crowded in from surrounding exhibits of the ACT-79 (Appropriate Community Technology) Fair on the Mall, which had been going on four days to demonstrate community-based technologies in areas ranging from energy to food production to the arts and housing.

The lead witness was the First Lady, Mrs. Rosalynn Carter, who informally described a number of conservation and small community technology efforts in areas she had visited around the country. Mrs. Carter graphically described the total effort in Davis, Calif.—a town of 35,000 with 27,000 bicycles—to apply conservation of energy in everyone's home through such measures as weatherization, in developing the town's streets and facilities to save energy and in practicing self-reliance. She said:

While I was there somebody gave me a solar dryer. It was a little box about this big (demonstrating), and you know what it had in it—a clothes line and some clothes pins.

Fuqua, Brown, Wolpe and Glickman were among the participants in this unusual experiment of bringing a subcommittee hearing to the people. Four panels held a lively discussion of various forms of appropriate technology, rural and urban applications, and the relation of appropriate technology to the Nation's energy consumption patterns.



Mrs. Rosalynn Carter testifies before the Ottinger subcommittee on April 30, 1979, in hearings in a tent on the Mall near the Lincoln Memorial. Chairman Ottinger is at left, and Staff Director Spensley at right.

CONSTRUCTION OVERSIGHT AND GEOTHERMAL ENERGY

In order to maintain tighter oversight over DOE construction projects, the committee in its markup adopted amendments recommended by the Ottinger subcommittee which limited DOE's discretion in transferring funds from operating expenses into construction projects without committee authorization. Also adopted was an amendment requiring DOE to submit an engineering design report, firm cost estimate, draft environmental impact statement, and detailed management plan to the committee for approval prior to spending money on construction projects amounting to over \$50 million.

For the first time since the start of the geothermal program, the committee, on recommendation of the McCormack subcommittee, voted only a very modest increase—\$500,000—over the administration request in the hot dry rock program. In 1979, the McCormack subcommittee once again authorized a second 50-megawatt hydrothermal demonstration plant. The McCormack subcommittee, supported by the full committee, finally convinced the administration of the need for a second hydrothermal plant.

Natural Resources and the Environment

It was George Brown's 11th year in the Congress before he became a subcommittee chairman. He might have become chairman of the full committee but for two developments. First, he did not opt to join the Science Committee until his second term started in 1965. Second, he filed for the U.S. Senate in 1970, and was defeated in the Democratic primary. He returned to the House of Representatives in 1973, and became chairman of the subcommittee named "Environment and the Atmosphere" at the start of 1975.

Brown received a degree in industrial physics from the University of California at Los Angeles. After serving in several engineering and management positions for the city of Los Angeles, he was elected to the Monterey Park city council and became mayor of that city and then a member of the State assembly. One of California's new congressional districts enabled Brown to run and win the first time in 1962. When he came back to win in 1972 after his Senate defeat, Brown chose another new district around Riverside and San Bernardino counties.

One of the earliest and most adamant opponents of the Vietnam war, Brown gained a reputation as a flaming, fighting liberal with a 100 percent labor voting record. He mellowed considerably during his later service in the House, avoiding personal confrontations, and carefully choosing the issues on which he took a stand. Brown set a goal of building cooperative relationships in a spirit of good will, both within the committee, with his colleagues, the executive branch and also on the outside. Whether by accident or design, the bread cast upon the water was returned many-fold, and Brown was soon scoring a string of notable legislative victories. While other Congressmen were strenuously fighting to defend their jurisdictional turf, Brown was cautioning:

There is more than enough work for all of us in Congress and we could move much more effectively by concentrating on working together, not struggling against each other or blindly pursuing independent and non-communicating courses.

Brown has a very broad perspective of the interrelationship of peoples and problems throughout the world, a perspective rooted in history as well as a vision of the future. "I have a lifetime interest in scientific research and its application to human affairs," Brown says, and proves it in practice. A strong advocate of "appropriate tech-

nology" instead of the big capital technologies too often favored in the past, Brown approaches issues in distinctly human terms. Surrounded by clouds of cigar smoke, he adds a uniquely personal imprint to everything he does, whether it is undergoing acupuncture in front of a large audience at a committee hearing, or sitting down in a lonely hotel room in Peking to scratch out a longhand letter to tell his staff of the significance of their work.



Representative George E. Brown, Jr., chairman of the Subcommittee on Environment and the Atmosphere, 1975-79, and chairman of the Subcommittee on Science, Research and Technology commencing in 1979.

A SEPARATE SUBCOMMITTEE ON THE ENVIRONMENT

The expansion of the committee's jurisdiction in 1975 gave Brown his chance to get his first subcommittee chairmanship. As with most of his activities, he planned carefully for the new responsibility. In the fall of 1974, with the assistance of two of his congressional staff members, Timothy B. Lynch and Thomas H. Moss (at that time a Science Fellow), Brown put together a recommendation that a separate environment subcommittee be established. He also made some discreet inquiries and pored over the list of senior committee members in determining that the environment subcommittee would fall into his lap.

A lot of effort went into various drafts of subject-matter which should be handled by an environmental subcommittee, so Brown was very well prepared to get off to a fast start at the beginning of 1975. The new subcommittee was named Environment and the Atmosphere, with the following jurisdiction:

Legislation and other matters relating to environmental research and development (including, but not limited to, EPA's research and development programs in Air and Water Quality and Solid Waste Disposal); the National Weather Service; the National Environmental Satellite Service; and the research and development activities of the National Oceanic and Atmospheric Administration (jointly with the Merchant Marine and Fisheries Committee).

Starting in 1975, the following members were assigned to the subcommittee:

<i>Democrats</i>	<i>Republicans</i>
George E. Brown, Jr., California, <i>Chairman</i>	Marvin L. Esch, Michigan
Mike McCormack, Washington	Larry Winn, Jr., Kansas
Dale Milford, Texas	Gary A. Myers, Pennsylvania
Richard L. Ottinger, New York	David F. Emery, Maine
Philip H. Hayes, Indiana	
Jerome A. Ambro, Jr., New York	
James J. Blanchard, Michigan	
James H. Scheuer, New York	

Staffing was a difficult problem. Committee executive director Swigert assigned Frank R. Hammill, Jr., a longtime veteran committee staff member, (see page 101) as subcommittee staff director. Brown, compatible with his prerogative, wanted to appoint his own staff man, Timothy B. Lynch, to the subcommittee staff. But as with other subcommittee chairmen, Swigert strongly resisted on the grounds of "qualifications." Dr. Radford Byerly, Jr. (a former Commerce Science Fellow) was assigned to the staff in May. There always seemed to be more work to do than staff available, so to a greater extent than many other committee members, Brown detailed Lynch and others on his congressional staff to help on committee work.

Following an organization meeting of the new subcommittee on January 29, Brown plunged into a wide-ranging series of activities which soon earned his subcommittee the reputation of the busiest group in the Science Committee. In the first two years it operated, the subcommittee held 97 hearings, meetings and markup sessions far and away the largest of any subcommittee. Brown kept the members' feet to the fire as they laid the basis for extensive oversight authorization and work on new legislation.

ENVIRONMENT AND SAFETY IN ERDA

One of the first challenges facing the Brown subcommittee was to review the environment and safety figures in the ERDA authorization bill, which had been sequentially referred after the two energy subcommittees had completed their work. To arrive at a decision on this issue, Brown had two days of hearings featuring ERDA, EPA and the Council on Environmental Quality. The Brown subcommittee endorsed the joint effort of the two energy subcommittees to add \$15.5 million to ERDA's environment and safety authorization (plus \$5 million to meet manpower needs). The subcommittee expressed concern on two scores: that the work was not well coordinated with the Environmental Protection Agency (EPA), and that too much of the concentration was in the nuclear area at the expense of environmental and safety R. & D. for fossil fuels. Brown and his subcommittee expressed this thought in their first subcommittee report on March 25, 1975:

Recognizing that ERDA inherited a large portion of its program, its technical talent, and its research facilities from the Atomic Energy Commission, it is understandable that the budget and program of this new agency are heavily weighted in favor of nuclear research at this early stage. * * * The subcommittee is convinced that a better balance must be achieved in the near future and that a conscious effort must be made to develop a substantial nonnuclear health and environmental research program.

The subcommittee also directed that ERDA and EPA submit a joint report on their respective responsibilities for environmental research related to energy, with an aim to reduce duplication and increase coordination. Brown always maintained a strong interest in full utilization of the national laboratories. Included in the 1975 subcommittee report was this warning:

Both EPA and ERDA should make use of the existing laboratories and facilities to the maximum extent possible, and construction of new facilities should be undertaken only after a thorough review and inventory of existing available facilities has been completed and the need for new construction is firmly established.

The full committee strongly supported the Brown subcommittee in the thrust of its efforts, noting in its report there was "an apparent need for additional research in the general environment and safety area."

NUCLEAR AND NONNUCLEAR R. & D.

Until the abolition of the Joint Committee on Atomic Energy at the beginning of 1977, and the transfer of its nonmilitary functions to the Science Committee, Brown continued to be disturbed by the relation between nuclear and nonnuclear energy research, and what he regarded as the overemphasis on the nuclear side. He told the House on June 19, 1975:

These views are personal, and are not meant to reflect adversely on any of the individuals involved. Basically, I believe that to achieve a satisfactory answer to the energy research and development problems of the Nation requires that a careful balance be achieved in the efforts and resources devoted to the various options available in the nuclear and nonnuclear energy fields. Neither of the two committees having jurisdiction are in a position to consider this balance adequately and reach reasoned decisions.

Early in March 1975, Brown led his subcommittee into uncharted fields by establishing the right to hold annual authorizations for the R. & D. operations of EPA, which had before that time gone directly to the House Appropriations Committee. This was a natural, though daring venture on Brown's part. In the first place, EPA was not the most popular agency on Capitol Hill, since to many Members and energy interests the EPA represented those forces which curbed energy production, was arrayed against the automobile industry, and was always citing producers for polluting the air and water. Second, EPA activities overlapped into the areas of interest of a large number of House and Senate committees, so that an attempt to assert authorization responsibility looked as though it might encounter some jurisdictional booby traps.

EPA RESEARCH AND DEVELOPMENT

Brown did not hesitate. For eight days, hearings and markup sessions dealt with a wide variety of areas, including air pollution, water quality, water supply, solid wastes, pesticides, radiation, noise, toxic substances and energy. Brown had a way of pressing forward in a patiently determined fashion, yet convincing his more conservative colleagues that he was a responsible legislator rather than a rabble-rouser. His words always sounded like they weren't going to upset any applecarts, yet when read in cold print they were downright revolutionary in spirit. For example, in opening the EPA hearings, Brown had a few choice remarks to shake the status quo, which were delivered in a quiet manner, but which expressed advanced views:

American business and industry understandably resists changes in established methods of production and distribution proposed by environmentalists.

Changes have frequently been expensive and inconvenient. With powerful economic interests arrayed against change, environmentalists have found they cannot rely upon presumptions or inferences of risk to the public health or welfare. They must have facts.

Under our present system the burden of proof rests with those proposing change. They are required to produce persuasive evidence—sometimes conclusive evidence—that proposed new regulations are indeed needed in the interest of the public health and welfare.

LET'S GET THE FACTS

As critics challenged EPA's intrusion into new areas of activity to protect the public health and welfare, Brown calmly responded: "We're only trying to get the facts, to replace emotional arguments." It was difficult to challenge that kind of logic, even though more money to get the facts frequently resulted in producing data to challenge polluters.

Brown's subcommittee also pioneered in another unheard-of practice, publishing the verbatim transcripts of all markup sessions—those informal conferences where decisions were made on how or whether specific programs would be supported. The markup sessions, once secret, were open to the public. Yet few subcommittees dared to bare the complete transcript in print, with all the various stages of mental undress which characterize legislators groping toward a conclusion.

One of the most significant amendments adopted in the subcommittee was a proposal by Hayes to require EPA to submit a 5-year research plan. This proved to be an excellent foresight and management tool in future years.

Before the Brown subcommittee took its bill to the full committee for final markup on May 15, 1975, Brown booked six days of "environmental posture hearings" at the end of April. The purpose of the hearings was to determine the nature and scope of environmental R. & D. programs throughout the Federal Government, in a dozen or so mission-oriented agencies which were spending between \$1.3 and \$1.4 billion annually on environmental R. & D. With EPA responsible for only 20 percent of the annual budget for all environmental R. & D., the subcommittee was concerned with what was being accomplished in other agencies and how it could be coordinated in the national interest.

DEPLETION OF THE OZONE LAYER

Brown had signal success in presenting his subcommittee report to the full committee. Not only did the full committee unanimously support an increased authorization for EPA, but also voted 15-13 for an amendment by Blouin to add \$2 million additional for research in noise control. The total increase of \$28.5 million voted by the committee included increases which had originally been denied by OMB in these areas: hazardous air pollutants, depletion of the ozone

layer of the stratosphere, solid waste disposal, and water pollution control. The issue of depletion of the ozone layer was just coming to the fore at the time the Brown subcommittee started its work in the early months of 1975. Much public attention had been focused on the danger that aerosol propellants, high-flying aircraft and photochemical reactions would so disturb the ozone layer as to destroy its protection against ultraviolet radiation from the Sun. This issue became the subject of a major inquiry by the Brown subcommittee later in the summer and, pending that inquiry, \$2 million was added to EPA's R. & D. authorization to support a program to complement what other agencies were doing.

SATISFYING BOB JONES ON WATER POLLUTION

The subcommittee had remarkable success when the EPA R. & D. bill reached the floor on July 10, 1975. Brown handled the bill adroitly in Teague's absence, orchestrating a series of supportive speakers, including Mosher, Hayes, Ottinger, Scheuer, Hechler, Ambro, and Winn. During the amending process, Representative Robert E. Jones, (Democrat of Alabama), Chairman of the House Public Works Committee, submitted an amendment to hike the authorization for water pollution control R. & D. from \$91 million to \$149 million. When Brown readily accepted this whopping increase and recommended its adoption, Jones was ecstatic:

Mr. Chairman, I would like to say that we are indeed fortunate to have the leadership of the gentleman from California (Mr. Brown) in the direction and in the purposes of the legislation that is now before this body. The committee is initiating a broad range of centralized effort in the field of research and development among the various agencies of the Government which I think will produce a more profitable, more uniform and more understandable research and development program. I think that the gentleman from California and the rest of the members of the committee are to be commended, and I again want to thank the gentleman for accepting my amendment.

The Jones amendment went through on a voice vote.

Back of the Jones amendment was an interesting story, the full details of which were not made public until Jones inserted into the July 10 Congressional Record the text of two letters written to the Chairman and Ranking Minority Member of the House Committee on Rules. On June 12, a blunt letter of protest had been sent to the Rules Committee, charging that the EPA authorization bill represented action by the Science Committee to "infringe drastically" on the jurisdiction of the Public Works Committee. The Rules Committee was requested not to grant a rule for the bill. Then on June 24, a follow-up letter was sent from the Public Works Committee to the Rules Committee.

The second letter indicated that discussions had been held with Brown, that Brown had agreed to accept the Jones amendment on water pollution projects, and that further opposition to the rule on the Science Committee bill was therefore withdrawn. Such is the power of compromise, and an indication that Brown, rather than encouraging confrontation and internecine warfare, preferred to "work things out." The House passed the EPA authorization bill on July 10 by a vote of 383-15. Although the EPA authorization got hung up in the Senate and was not finally passed until 1976, the President signed it into law and after 1976 the Science Committee could legally proceed with the annual authorizations which Brown's subcommittee had first initiated.

THE THREAT OF RADIATION AND SKIN CANCER

With the completion of the ERDA and EPA authorizations in 1975, the Brown subcommittee turned its attention to what was termed "inadvertent modification of the upper atmosphere" through possible depletion of the ozone layer by halocarbons. The central purpose of the effort was to determine the adequacy of R. & D., not only to assess the factual nature of health threats but to form the basis for necessary regulations. The health hazard of exposure to radiation, with possible development of skin cancer, had been explored in prior hearings by the Health Subcommittee of the Interstate and Foreign Commerce Committee chaired by Representative Paul G. Rogers (Democrat of Florida). A bill introduced by Esch had been jointly referred to the Brown subcommittee and the Rogers subcommittee, followed by frequent staff liaison between the two subcommittees. Once the bill was worked over, a joint meeting was held with the Rogers subcommittee to agree on the basic text of the bill.

While this process was going on, the Senate adopted an amendment to the NASA authorization act in 1975, giving NASA authority to conduct a comprehensive program of research, technology development, and monitoring. Brown arranged for a June 9 colloquy with Fuqua, chairman of the subcommittee handling NASA, when the conference report was debated on the House floor. Brown quoted NASA's statement in his subcommittee's hearings that NASA would turn over "operational monitoring" of the upper atmosphere to another agency like NOAA once the preliminary investigations were done. Brown received an affirmative answer from Fuqua to his question that the conference report "does not at all imply any sort of regulatory role for NASA." Fuqua also confirmed the conclusion that NASA would solicit the views of EPA in planning its research program.

The Brown-Fuqua colloquy did not completely smooth out the relationship between NASA and EPA, or jurisdictional struggles which ensued over which agency should take the lead in R. & D. relating to the politically explosive issue of what was happening to the ozone in the upper atmosphere. NASA, through its friends on the Science Committee, continued to push to broaden its jurisdiction in this area. Brown, strongly supported by Esch, acted as the defender of the less politically popular EPA. Meanwhile, Brown and his staff touched base frequently with the Interstate and Foreign Commerce Committee. He was able to fend off an attempt by Milford to gut the bill when markup time arrived in the full committee on October 9, 1975.

The wide publicity on aerosol spray cans and their effects on the ozone layer thrust the issue into the forefront of public discussion more and more as time went on. The bill reported by the Science Committee was merged in with the Clean Air Act amendments which passed the House, but failed to clear the conference committee in 1976. A new bill was eventually signed by President Carter in 1977, essentially embodying the recommendations of both the Science and Interstate and Foreign Commerce Committees.

SULFATES IN THE ATMOSPHERE

It was a characteristic of the Brown subcommittee to keep several balls in the air at the same time. While the ozone fight was going on, another issue which occupied the subcommittee was oversight on the R. & D. relating to sulfates in the atmosphere. Brown, along with Ottinger, had introduced legislation early in 1975 to address the public health problems resulting from the increased use of energy, especially coal. During four days of hearings in July 1975, the subcommittee analyzed sulfate emissions from stationary sources, as well as assessing the nature and adequacy of EPA's control technology and strategy. The sharp issues of automotive emissions revealed the strength of the influence of the automobile industry on the opening day of the hearings when Esch declared:

I think that the hearings will address a fundamental question which is of great significance to the country and especially Michigan, and that is: Does the Federal bureaucracy, without sufficient research basis, have the authority to impose regulations that have a major negative economic and environmental impact upon our citizens?

I think it has become increasingly clear that with the catalytic converter this was the case where thousands of Michigan workers have been thrown out of work primarily because of the consumer concern over emission control.

Esch concluded that "it's time the Federal Government end its adversary relationship with the automobile industry."

Brown disagreed. He pointed to a study done for the subcommittee by the Congressional Research Service which concluded that 99 percent of the sulfates in the ambient air were derived from stationary sources, and less than 1 percent generated by catalyst-equipped vehicles. As a Representative of a southern California district deeply concerned with air pollution, Brown had been involved in most of the air pollution battles of the prior decade.

During the stickily humid summer of 1975, the Brown subcommittee plowed ahead with six days of oversight hearings on the National Oceanic and Atmospheric Administration (NOAA), climaxed by a seventh day to receive testimony from the Chairman of the National Advisory Committee on Oceans and Atmosphere. Brown made an oblique reference to the Hechler-Hansen colloquy (see chapter XV) which had established joint jurisdictional responsibility over NOAA between the Science and Merchant Marine Committees. The subcommittee delved into the environmental monitoring elements of NOAA, including the Global Atmospheric Research program, the National Weather Service, and programs on climate, air pollution, weather modification, and severe local storms. The subcommittee also reviewed the marine resources programs of NOAA. These overview hearings laid the basis for additional legislation in subsequent years, as will be seen.

WASTE DISPOSAL POLLUTING THE OCEANS

On September 17, 1975, the Brown subcommittee had five days of hearings on "The Environmental Effects of Dumping in the Oceans and Great Lakes." Brown noted at the outset that there was simply not enough information available on the transport of waste materials and their disposal in the ocean. The purpose of the hearings was to build up the data needed concerning environmental effects. He remarked:

With sufficient information on environmental effects and alternatives to ocean dumping, rational policy choices can be made to assure that the oceans will be preserved as fisheries and recreational areas.

Representatives of Federal agencies like the Coast Guard, Corps of Engineers, EPA, and NOAA were joined by environmentalists, biologists, and other members of the scientific community. They discussed such developments as the ocean dumping of municipal sewage sludge, acid waste disposal by industry, and other pollutants which were having a measurable effect on the nature of the ocean and its marine life.

In November 1975, Brown's subcommittee in conjunction with the Oceanography Subcommittee of the Merchant Marine and Fisheries

Committee sponsored one of the regular monthly meetings of the National Advisory Committee on Oceans and Atmosphere in the Science Committee room in 2318 Rayburn. NACOA, consisting of 25 Presidential appointees from a broad representation of the public, is responsible for reviewing the progress of marine and atmospheric activities. The special meeting helped the members get an update on oceanic and atmospheric issues, and also assisted in paving the way toward revising the 1972 legislation regulating ocean dumping and waste disposal.

The subcommittee published its report on "The Environmental Effects of Dumping in the Oceans and Great Lakes" at the end of 1976. The report concluded that there should be a better policy overview of research in the area, since several agencies, each having a different primary mission, were carrying out the research. The need for coordination, setting of priorities, and proper allocation of funding was stressed.

ENVIRONMENTAL RESEARCH CENTERS

Another initiative undertaken by the Brown subcommittee in 1975 and 1976 was to hold a series of hearings on H.R. 35, to establish environmental research centers in various States and regions of the country. As Brown explained in opening the hearings in October 1975:

H.R. 35 is not designed to provide financial assistance for the construction of new laboratories. Rather, the bill would make available Federal funds to existing educational institutions designated as environmental research centers by the Governors of the various States.

Even though this bill did not pass, the hearings proved to be a good sounding board for the subcommittee's encouragement of basic and applied research, as well as environmental education and training. In a report issued in December 1976, the subcommittee summarized the history and current efforts to enact legislation similar to H.R. 35, and recommended that "ongoing Federal university programs be assigned greater roles in environmental research and development."

CHRONIC EXPOSURE TO LOW-LEVEL POLLUTANTS

Another trail-blazing inquiry by the Brown subcommittee got under way in November 1975 when the subcommittee investigated the long-term exposure to low levels of environmental contaminants. Brown notified his fellow committee members:

The purpose of these hearings is to determine the long range effects of constant exposure to very small concentrations of pollutants present in the environment, to determine whether or not we might exceed the safety threshold and what this threshold might be. We wish to know what these effects would be on human and animal health, agriculture and food supply, the weather and climate.

He stated on the opening day of the hearings:

For example, at one time traces of arsenic were administered as a medication. It is a well-known fact, however, that prolonged use does not have the benefit sought and, in fact, its cumulative effects were sometimes exploited by those desiring to get rid of cumbersome relatives.

The Congressional Research Service prepared an analysis of "Effects of Chronic Exposure to Low-Level Pollutants in the Environment", at the request of the subcommittee. The study outlined the magnitude and extent of the environmental threat of these pollutants. The report also noted the inconsistencies in both legislation and administrative action in this area. For example, most Federal pollution control, and public health statutes do not differentiate between chronic, low-level effects on man and the environment and more acute, immediate effects. The study observed:

That fact that there is no uniform approach in these statutes to such matters as identifying pollutants, evaluating scientific data, and setting tolerance levels for protection from pollutants, should not be surprising. These statutes were formulated at different times by different Congresses and by different committees in Congress in response to different perceptions of different problems and in response to different pressures from public opinion and from regulated industry.

With the assistance of CRS, a final report was prepared by the subcommittee and released in 1976. The report discussed the rising cancer death rates, which correlated strongly with where a person lives and works. Also noted were the trace elements and chemicals in air and drinking water, and the need for more scientific data to tackle some of these emerging problems.

EPA'S RESEARCH PRIORITIES

At the end of 1975, the subcommittee tackled the problem of the organization and management of EPA's Office of Research and Development. During the five days of oversight hearings, the subcommittee probed EPA's research priorities, including the justifications for long-term versus short-term research. The hearings started on the fifth anniversary of the establishment of EPA, which had pulled together 42 geographically dispersed research institutions of widely differing character. The subcommittee was reinforced in its conclusion that sound scientific analysis and reliable evidence were absolutely essential to measure threats to public health or welfare, and to support defensible standards. The economic costs of change in order to meet environmental risks were indicated to be so great that only through adequate R. & D. could an organization like EPA credibly carry out its mission. The subcommittee recommended additional attention to more fundamental research on environmental matters—"patient,

uninterrupted, long-term research characterized by continuity and stable funding."

In 1976, the subcommittee decided not to become as actively involved in the ERDA environment and safety authorization as in 1975. One brief hearing was held, after which the subcommittee endorsed the recommendations of the Hechler and McCormack subcommittees in the areas of environment and safety. However, the subcommittee did call attention to the need for better coordination between ERDA and EPA on environmental issues.

EPA SUDDENLY BECOMES UNPOPULAR

The EPA authorization in 1976 proved to be far more controversial. OMB slashed EPA's budget by \$42 million, down to a level of \$240.4 million. The Brown subcommittee voted modest increases of \$16.6 million in several research areas, including airborne carcinogens, acid rain, oxidant and sulfate transport, and water quality research. Brown and Winn successfully cosponsored an amendment in subcommittee which improved the coordination of environmental research in various Federal agencies. But a buzz saw awaited the EPA authorization bill when it reached the House floor on May 4, 1976. This was just about the time the subcommittee was engaged in an investigation of charges that EPA had falsified or misused data on the adverse effects of air pollution (see chapter XV). Goldwater used the EPA authorization debate as a sounding board to air these charges. Ketchum stirred a lot of support for his amendment to require the EPA Administrator to furnish Congress with every proposed rule and regulation, giving Congress the chance to disapprove such regulations within 60 days. In opposing the Ketchum amendment, Brown told the House:

I rise with some reluctance because I recognize the popular sentiment which exists today with regard to the need to control the excesses of the bureaucratic machine which is identified with Washington. * * * The proper course to follow, it seems to me, if we are dissatisfied by the procedures followed by the executive branch is to revise the Administrative Procedures Act to make sure that there is adequate input from all members of the public, and of the special interest groups that are concerned and even from Members of Congress who may have a concern. But to take it upon ourselves to assume the responsibility of reviewing the tremendous mass of data put out in the rules and regulations of the executive branch in advance of their promulgation is not the way to legislate.

But the tide of opposition to bureaucratic rules and regulations was running too strong, and Ketchum's amendment was adopted by a rollcall vote of 228 to 167. The amendment was so popular that it attracted the support of a large number of committee members, including Blouin, Fuqua, Symington, Roe, Milford, Harkin, Lloyd of California, Lloyd of Tennessee, Blanchard, Wirth, Jarman, Wydler, Winn, Frey, Goldwater, Conlan, Esch, Emery, and Pressler.

Foley also offered an amendment, as he had in 1975, to withhold any funds authorized by the Federal Insecticide, Fungicide and Rodenticide Act until the Committee on Agriculture, which he chaired, had acted. The Foley amendment was accepted, as it had been the prior year. Once the Ketchum and Foley amendments went through, the EPA authorization was passed. But many Members shared the feeling of Winn who told his colleagues in 1976:

Many people perceive EPA as a stumbling block or nemesis in the search for new energy sources. It would be better for the EPA to work with energy producers in resolving environmental questions rather than to become a perennial bane. We would like to hear of the EPA accelerating new energy sources instead of delaying them.

SOLID WASTE

In January 1976, Brown circularized his subcommittee members and asked for their ideas and suggestions on R. & D. in the area of solid waste, along with energy which could be recovered from solid waste. Considerable advance planning went into four hearing days which started on April 6. Once again this was an area which involved shared jurisdiction with the Interstate and Foreign Commerce Committee. As Brown remarked in a report:

The term "solid waste" included in its meaning garbage, yard trash, commercial wastes, demolition debris, mining, agricultural and industrial wastes, and sludges from pollution control facilities. * * * Resource recovery refers to the reclaiming of materials and energy from wastes so that they can be recycled back into the economy.

The hearings focused on legislation introduced by Representative Robert F. Drinan (Democrat of Massachusetts), who was the leadoff witness. Blouin and Harkin also testified, and Scheuer submitted a brief statement. Harkin told the subcommittee about the resource recovery operation in his hometown of Ames, Iowa, which was providing 20 percent of the fuel needed for the municipal powerplant. Although the Ames plant received refuse from most areas of the county, one of the problems encountered in 1979 was that the plant had been built too large, and there was simply insufficient garbage within the county to justify operating it seven days a week.

At the subcommittee markup session on July 22, Brown mentioned that he had had several conversations with Representative Fred B. Rooney (Democrat of Pennsylvania) about the comparable legislation which was being developed in the Commerce Committee. Brown mentioned:

There are certain problems in this bill as a result of the fact that it is a joint operation between this committee and the Commerce Committee, and we always have difficult problems of jurisdiction. I want to report that cooperation between the staffs, based upon everything that I have been told, has been excellent, and this

work represents a joint effort of the two committee staffs. * * * There have been no problems that were not easily resolved as far as our two positions were concerned.

During the subcommittee markup session, Ambro, who had had considerable personal experience as a town and county supervisor in newer methods of solid waste disposal, urged the staff to assemble fuller data on the advanced methods being developed in other countries. When the bill reached the full committee markup, Brown presented an amendment which had been worked out with Hechler to expand solid waste studies to include an analysis of the adverse effects of wastes from active and abandoned underground and surface mines.

COORDINATION WITH COMMERCE COMMITTEE

On August 30, 1976, Teague dropped a note to Commerce Committee Chairman Staggers:

I am writing to suggest a procedure for coordination of our two committees on solid waste legislation that will recognize and maintain the separate jurisdictions of the two committees.

He then reviewed the success of the process which had been used when the Science Committee had worked with the Commerce Committee on the ozone protection provisions of the Clean Air Act. Teague suggested that the Science Committee bill be incorporated as a separate title in the Commerce Committee bill, and that explanatory material developed by the Science Committee be included with the report on the legislation. Staggers readily agreed to this approach, and joined Teague in a letter to the Chairman of the Rules Committee on September 9, asking that the bill be given a hearing. Teague modestly suggested that he be given 20 minutes of time for floor debate while Staggers should be allocated a full hour. The Rules Committee, in granting a rule, recognized the joint jurisdiction of the two committees but gave Teague and Staggers each one hour to make their case on the House floor.

Working closely with William Kovacs of the House Commerce Committee staff, Dr. Byerly helped draft the R. & D. title of the Resource Recovery Act which was then merged with the regulatory bill which came out of the Commerce Committee. Brown and Rooney gave their blessing to the final version in a hastily called session held in the Rayburn Room. As Brown reported to the full committee, the R. & D. sections of the bill included the authorization of several research studies and demonstrations designed to aid the marketability of separated materials, to improve land disposal practices, to reduce the environmental impact of hazardous wastes, and to develop clean ways to burn wastes and produce the most energy where possible.

"YOU GUYS WORK OUT YOUR OWN PROBLEMS"

One day Dr. Byerly and Kovacs wandered into the Speaker's Office to check on when the bill would be coming up for debate, since the session was nearing a close at the end of September. This was just about the time when Teague and a majority of the Science Committee were locked in a bitter struggle with the Commerce Committee over loan guarantees, and both committees were maneuvering to get support from the Speaker. As soon as the Speaker's Office learned that the two visitors were from the Science and Commerce Committees, the word went out from one of the Speaker's aides:

You guys are going to have to work out your own problems. Don't come up here and expect us to settle your fights.

It took considerable effort to explain that the presence of the two staff men exemplified a good working relationship between two committees, rather than the usual jurisdictional brawl which the Speaker was so frequently being asked to referee. The message finally got through.

Brown was moved to declare on the House floor on September 27, 1976, when the bill came up for House debate:

I want to commend this bill to the consideration of all the Members as illustrating the way in which two committees, motivated by a desire to cooperate, can achieve a laudable goal in the construction of a vital piece of legislation.

THE CONFERENCE COMMITTEE WHICH DIDN'T FORMALLY MEET

The manner in which agreement was reached with the Senate, without the necessity of a conference committee meeting, was perhaps even more remarkable. Because it was so late in the session, negotiations were started with the Senate even before the bill passed the House. As a matter of fact, the House Members held their conference with the Senate prior to passage of the bill in the House, agreed to language which would be accepted by both bodies, and then submitted a blanket amendment on the House floor embodying the results of the agreement. The final details of the agreement with the Senate were hammered out only about 30 minutes before the bill came up in the House. As a result, xeroxed copies were substituted for the language of the bill as it had cleared the Science and Commerce Committees, and adopted by voice vote. Then the House went on to approve the amended bill by 367 to 8 on a rollcall. It was a major triumph for the Brown subcommittee, dealing with 2.8 billion tons of all kinds of solid waste generated every year in the United States. President Ford signed the bill into law on October 20, 1976.

WEATHER MODIFICATION

The Brown subcommittee set a legislative speed record for its own activities with the passage of the National Weather Modification Policy Act of 1976. On June 1, Brown announced he would hold hearings on a bill introduced by Representative Frank E. Evans (Democrat of Colorado), the House passed the bill on September 20, and the President signed it on October 13. Hayes, the Indiana freshman who left the House to make an unsuccessful bid for a Senate seat in the Democratic primary in 1976, presided over the first day of the hearings. In announcing the hearings, Brown noted:

Serious experimentation with weather modification is a post-World War II phenomenon, beginning in 1946 with cloud seeding for precipitation augmentation. Under certain limited conditions experts now believe that we are capable of increasing or decreasing precipitation, suppressing hail and lightning, dispersing fog over highways and airport runways, and possibly diminishing the force of hurricanes and other violent storms.

Proponents of weather modification anticipate potential benefits, while opponents believe there are grave risks involved. Revelations in recent years that we used this inexact science for military purposes in Indochina have been cited to indicate the need for careful consideration of the many aspects of this subject.

The law was a modest one, authorizing a \$1 million, one-year study by the Secretary of Commerce on the state of scientific knowledge and technological development concerning weather modification, with recommendations for the future. An additional \$200,000 was provided for ongoing weather modification activities.

LET THE RAIN COME FROM GOD

Winn and Brown were the principal spokesmen for the bill when it reached the floor on September 20, under suspension of the rules procedure. Winn told the House that "all too often weather modification evokes an uneasy response from persons who are not familiar with the facts. This legislation will dispel any lingering apprehension." The attack against the bill was led by Representative Steven D. Symms (Republican of Idaho), who charged that "the Congress is trying to get into everybody's business including Mother Nature."

In responding to Symms, Winn admitted that the administration was opposing the bill, but their opposition to it "was picked out of thin air" without an adequate explanation. Symms came back and argued:

I think any place we can draw the line would be a good place. This is not one of them. Let us just let rain come from God, and not from the Government, for a change.

Brown countered:

I must say to the gentleman that the activities of the Weather Bureau and the other activities regarding weather, which are historic activities of the U.S. Government, are among the most cost-effective activities conducted by the Government.

The bill passed on a roll call vote by 292-91. Among committee opponents were Conlan, Lloyd of Tennessee, Myers, and Wydler. Despite the negative signals sent out from the White House, as noted, the President signed the bill into law on October 13, 1976.

NATIONAL CLIMATE PROGRAM

Laying the basis for future legislation in the 95th Congress, the Brown subcommittee tackled the subject of climatic change, and in particular a bill introduced by Hayes to create a national climate program. The Hayes bill was based on recommendations made by the National Academy of Sciences in 1974, and repeated in reports made by the President's Domestic Council and Central Intelligence Agency (CIA). The CIA report warned that "the new climatic era brings a promise of famine and starvation to many areas of the world." Brown's subcommittee was moved to act also by dramatic events like the Russian wheat failure, the loss of Peruvian anchovy fisheries and severe drought, such as in the African Sahel. The subcommittee summoned Federal officials and scientific experts to help inform Congress and the public of recent developments in our understanding of the climate, the advances made possible by new technology, what was being accomplished in climate research and monitoring, and the possibilities of establishing a national climate program. Beyond the six days of Washington hearings, the subcommittee visited various NOAA field research facilities, including the National Severe Storms Laboratory in Norman, Okla.; the Environmental Research Laboratory and the National Center for Atmospheric Research in Boulder, Colo.; and the Severe Storms Forecast Center in Kansas City, Mo.

Despite the wide support for the Hayes bill, it was decided to defer action on the legislation until the succeeding Congress when it was hoped that more backing could be generated.

LONG-RANGE PLANNING

The oversight program of the Brown subcommittee in 1976 also extended to joint hearings with the Subcommittee on Fisheries, Wildlife Conservation and Environment of the Merchant Marine Committee on the subject of "Long Range Planning in the Federal Government." It was during the course of these unique joint hearings that Brown met James W. "Skip" Spensley, then Counsel to the Fisheries Subcom-

mittee who designed the joint initiative and who later became Brown's subcommittee staff director during the 95th Congress. In preparation for these hearings, in response to a joint request from Brown and Representative Robert L. Leggett (Democrat of California) of the Merchant Marine Committee, the Congressional Research Service produced a 587-page pamphlet which examined all angles of "Long Range Planning."

In September and October 1976, the Brown subcommittee held four days of oversight review on the issue of "Water Quality Research." Federal and municipal officials, consulting engineers, equipment manufacturers, and members of the academic community testified on the most modern technology being utilized to protect water quality and improve waste disposal and municipal sewage treatment plants.

BROWN APPRAISES THE PROS AND CONS

Reflecting on the work of the subcommittee in an unusually candid appraisal printed in the Congressional Record of October 26, 1976, Brown weighed some of the pros and cons of his subcommittee's work during the 94th Congress:

Any new arrangement, such as that which created this subcommittee, causes confusion and conflict. I must confess that the first two years of operation of the Subcommittee on Environment and the Atmosphere had more difficulties than I expected. In spite of this, I believe the record of this subcommittee deserves attention and praise, because it has accomplished much in its two years of existence.

The main source of difficulty comes from the fact that the jurisdiction of the subcommittee originally comes from other committees and continues to overlap with many other committees of Congress. Because of this, both I, as chairman, and the committee staff needed to make a special effort to work cordially and effectively with other committees.

Brown mentioned especially the close working relationships he had established with subcommittees of the Commerce and Merchant Marine Committees. The nature of these cooperative relationships were uniquely successful, leading Brown to conclude:

My experience during this Congress, in this subcommittee and in others, has convinced me that joint activities between subcommittees of the Congress is an important and necessary activity for the effective functioning of this body.

This approach contrasted with that of some committee chairmen and subcommittee chairmen who seemed more concerned with protecting their turf and their sole right to attract the media attention which accompanied single-handed action. Brown took the long-range view toward working to develop a consensus to produce progress, and he almost studiously avoided confrontations.

PLANNING FOR THE 95TH CONGRESS

After the 1976 election, Brown asked his staff to come up with an analysis of the issues and oversight subjects which might be considered by the subcommittee in the 95th Congress. It was characteristic of Brown to insist on planning carefully for the future. Four days before Christmas he assembled the holdover subcommittee members for a general discussion of the agenda for 1977 and 1978. He also moved to obtain the services of a new staff director, James W. "Skip" Spensley, who had served as Counsel for the Leggett Subcommittee on the Merchant Marine Committee.

A graduate engineer of Iowa State University with a law degree from George Washington University, Spensley had a varied and responsible experience organizing and directing numerous environmental groups. He also did environmental consulting work, and practiced law, specializing in environmental law. Prior to joining Leggett's subcommittee staff in 1975, he had also worked in the area of environmental management for both private firms and municipal and State governments, giving him a working knowledge of the National Environmental Policy Act, the Clean Air Act, and the other legislation with which Brown's subcommittee was dealing. By 1977, particularly with a man having Spensley's qualifications, it was getting impossible for the powers that be to resist the efforts of subcommittee chairmen to appoint their own staff directors. Spensley came on board as staff director of the Brown subcommittee in March 1977. His ability to work smoothly with the staff and his good personal relationships on Capitol Hill were great assets.

At the start of 1977, the following Members served on the Subcommittee on Environment and the Atmosphere:

<i>Democrats</i>	<i>Republicans</i>
George E. Brown, Jr., California, <i>Chairman</i>	Robert S. Walker, Pennsylvania
Timothy E. Wirth, Colorado	Larry Winn, Jr., Kansas
Jerome A. Ambro, New York	Edwin B. Forsythe, New Jersey
Doug Walgren, Pennsylvania	
Anthony C. Beilenson, California	
Wes Watkins, Oklahoma	
Tom Harkin, Iowa	

THE NEW JURISDICTION

Under the jurisdictional rules adopted in 1977, there was only a slight change in the phraseology used to describe the jurisdiction of the Brown subcommittee, which read:

Legislation and other matters relating to environmental research and development (including, but not limited to, EPA's research and development program, ERDA's environment and safety program, life sciences and bio-medical applications),

the National Weather Service; the National Environmental Satellite Service; and the research and development activities of the National Oceanic and Atmospheric Administration.

The obvious first priorities when the 95th Congress got under way in 1977 were to get the EPA and ERDA authorization bills cleared for the initial March 15 deadline set by the House Budget Committee. The EPA bill presented some of the toughest parliamentary problems. For two years, the Brown subcommittee had been patiently trying to discharge its responsibility to authorize all EPA R. & D. This was a responsibility, although not written into any statute or rule, which Brown seized on and assumed. In 1975, the EPA R. & D. bill cleared the House, but was not passed by the Senate until late 1976. It was signed into law long after the subcommittee started its work on the new 1976 authorization. Therefore, the subcommittee started in 1977 to tackle another new authorization, not knowing what would happen in the Senate or with the new Carter administration.

The whole issue of EPA authorizations was complicated by the fact that EPA drew its authority from a mixed bag of different pieces of legislation which had in the past done the authorizing job for all of EPA, including R. & D., in most cases on a multiyear rather than an annual basis. EPA drew its authority from the Clean Air Act, the Federal Water Pollution Control Act, the Toxic Substances Control Act, the Safe Drinking Water Act, the Solid Waste Disposal Act, the Public Health Service Act, the Resource Conservation and Recovery Act, the Noise Control Act of 1972; and the Marine Protection, Research and Sanctuaries Act; finally, the Federal Insecticide, Fungicide, and Rodenticide Act.

FROM CHAOS TO CONFUSION

The insistence of Brown on plunging into the thicket of annual authorizations was not only for the purpose of furnishing monetary figures for particular programs, but also to exercise organizational oversight over the much-criticized management of EPA's Office of Research and Development. Since its inception, the EPA R. & D. effort had gone through three reorganizations and three different heads in its six years of existence—a factor which obviously added to its burdens. Since EPA had to produce the scientific information and technology on which control and abatement programs were based—all within the challenges of this mish-mash of differing statutes—there were frequent occasions when deadlines in the regulatory legislation imposed impossible demands on research programs. You can't just pick research off the shelf the minute you need its results. So EPA was constantly being criticized for being unresponsive to the regulatory

programs. Within the scientific community, the National Academy of Sciences was charging that EPA was not doing enough long-term research.

Into this tangled situation, Brown's subcommittee confidently moved once again early in 1977 to come up with an R. & D. authorization bill for EPA. During five days in February and early March, the subcommittee held its hearings. Brown opened the hearings with an apt characterization:

Out of this organized chaos, I hope we can get down to mere confusion shortly.

Brown acknowledged that EPA was the lead agency for environmental research. But he expressed the opinion that in the past OMB had greatly overemphasized the role of EPA as a lead agency, to the detriment of cooperative environmental research with other agencies like ERDA, NASA, NOAA, DOT, and others.

Out of the hearings, several conferences and markup sessions, as well as meetings with Senate staff, emerged a much more positive EPA R. & D. authorization than had been possible in the past. The subcommittee had reached a level of sophistication that, by carefully working with EPA staff, it was possible to key the authorization specifically to the legislation and EPA responsibilities in each program area. This represented a major step forward not only in determining priorities, but also in setting oversight benchmarks. In dollar figures, the subcommittee recommended a \$25 million, or 9½-percent increase, over the President's budget. Otherwise, because of the inflation rate, EPA R. & D. would have actually sustained a cut, especially in view of the additional responsibilities in the areas of solid waste and toxic substances as a result of 1976 legislation.

The full committee on March 30, 1977, approved these recommendations, as well as several additional concepts written into the legislation approved by the subcommittee. Henceforth, in its 5-year research plan, EPA was required to project three different options—for a no-growth, moderate-growth and high-growth budget. One of the most significant subcommittee additions was to establish the Science Advisory Board by statute, increasing its responsibilities and providing that the Board also review EPA's five-year plan. The Board helped provide independent advice to the EPA Administrator from the scientific community. As Brown told the full committee:

The subcommittee felt that the Science Advisory Board should retain its non-Federal nature—by that I mean no Federal employees would be members of the Board—in order to gain the advice of our best scientific minds on the outside of the present Federal structure.

Harkin added \$1.1 million in the full committee to support the solid waste activities program, with particular reference to the Ames, Iowa, resource recovery facility. Goldwater added several amendments

to require the Science Advisory Board to report on health effects research, to require EPA to implement recommendations the committee had made in 1976 on the Community Health and Environmental Surveillance System (CHESS), and to improve coordination.

In presenting the EPA R. & D. bill to the House on April 19, 1977, floor manager Fuqua commented:

The bill we are considering today is especially timely, since we now have a new administration which has expressed strong commitment in the environment area.

In supporting the bill, Walker praised the attention given to water quality and solid waste landfill projects. While endorsing the bill, Winn told the House:

I believe it is essential that EPA personnel actually roll up their sleeves and get their hands dirty with environmental technology before they seek to compel the private sector to implement technical systems of doubtful merit. To put it in the Carteresque dialect, the EPA should not force others to do something which it cannot do itself.

I certainly endorse President Carter's statement that agency heads should personally read all regulations promulgated by their organizations. If that practice were followed, it would be a major step forward in reducing the doubletalk in bureaucratic Washington.

During the amending process, Representative James P. Johnson (Republican of Colorado) successfully attached an amendment adding \$25 million to authorize EPA to do R. & D. through grants to study the reuse of waste water for drinking water. The bill passed by a margin of 358 to 31, and the conference report cleared on October 25 by 343 to 19.

ENVIRONMENT AND SAFETY IN 1977

In 1977, the Brown subcommittee assumed two entirely new responsibilities in the environment and safety area. Up to that time, in 1975 and 1976, the Hechler and McCormack energy subcommittees had insisted on their prerogative to review in the first instance the environment and safety authorizations for ERDA. It was only after the two energy subcommittees had pawed over these figures that Brown's subcommittee got a chance to take a crack at the environmental and safety aspects of energy. As a result, the Brown subcommittee had generally deferred to the decisions of the Hechler and McCormack subcommittees. But in 1977, for the first time, the Brown subcommittee was given exclusive jurisdiction over environment and safety in ERDA—and ERDA's successor, the Department of Energy. Additionally, since the jurisdiction over nuclear matters came to the Science Committee in 1977, this further broadened the Brown subcommittee jurisdiction in the critically important area of nuclear safety and environmental protection.

The subcommittee had the advantage of summoning witnesses from the Council on Environmental Quality, ERDA, EPA, and national laboratories in an effort to achieve the improvements in coordination for which the subcommittee had been striving. "Maybe we just ought to call them up here and referee," suggested Winn. He also had a suggestion to reduce paperwork in environmental impact statements:

Can you have a short form and a long form? And throw out the long form?

Wirth took the lead in insisting that ERDA should do a more thorough job of seeking out those workers who had been exposed to occupational hazards such as radiation, and had since left their jobs. He also successfully sponsored an amendment on the House floor which required that ERDA-specified safe containers be used for the shipment of plutonium.

Although the environment and safety features of the ERDA bill were overshadowed by the extensive fight over the Clinch River Breeder Reactor (see chapter XVIII), the Brown subcommittee made several recommendations which were eventually incorporated in legislation which the President signed on February 25, 1978. The environment and safety features of the ERDA were increased by \$10 million over the President's budget request to undertake the National Coal Utilization Assessment, a study of the safety of liquefied natural gas, a study of the environmental consequences of increased atmospheric carbon dioxide concentrations as a result of fossil fuel combustion, and decontamination and decommissioning problems. The subcommittee also directed the development of a plan for disposition of the Western New York Nuclear Service Center at West Valley, N.Y.

BROWN'S PHILOSOPHY

Brown's philosophy on environment and safety R. & D. was best expressed during this period in a statement which he made on April 6, 1977, before the Public Works Appropriations Subcommittee:

It is less costly to incorporate control technologies into technologies as they are being developed, rather than retrofit them once they are found to violate environmental, health and safety regulations. In the same vein, it is greatly advantageous for decision makers to be aware of all costs and benefits associated with the various technologies in making equitable choices among energy policy options.

He warned that it was essential that there be improvements in waste disposal, and other environment and safety measures, or else "we may not have a nuclear program." At the same time, Brown came down hard on the need to "assess the long-term environmental and socio-economic implications of increased coal burning in different regions."

This exchange with Hal Hollister, ERDA's Deputy Assistant Administrator for Environment and Safety, illustrated Brown's method of approach:

Mr. BROWN: Our purpose this morning was to create a confrontation between the agencies, and some outsiders who have a relatively objective point of view, in order perhaps to spark a few clashes on this matter of coordination. We may or may not have succeeded.

Mr. HOLLISTER: I think that this subcommittee has been extremely helpful, and has done a service not only to the two agencies (ERDA and EPA) but to the Nation's energy program as a whole, by asking the kinds of questions being raised.

Early in 1977, the Brown subcommittee had to do some fire brigade work. The Carter administration sent down some proposals to defer expenditures in the environment and safety area. Brown and Lloyd of California successfully put through the necessary House resolution of disapproval to insure that these vital expenditures go forward.

ENVIRONMENTAL IMPLICATIONS OF ENERGY PLAN

When President Carter unveiled his National Energy Plan on April 20, 1977, it set off a large number of initiatives by the Brown subcommittee. The environment and safety implications of stepping up the use of coal and nonplutonium based nuclear power immediately raised the question of whether existing environmental R. & D. programs were adequate to meet these new challenges. Brown stated on June 7, on the eve of subcommittee hearings called to examine the issues:

A change in directions as profound as that presented by the President's energy plan demands a thorough re-analysis of the research, development and demonstration programs in the environmental area. Our committee has the responsibility of seeing whether environmental research program resources and emphasis are appropriate for judging effects and protecting the environment from harmful aspects of energy production.

Producers, consumers, environmentalists, industry representatives, Federal and State officials and outside witnesses aired the implications of the President's National Energy Plan in the June 1977 hearings. Brown adopted the adjective "foresight"—rather than oversight—to describe the hearings which the subcommittee kicked off in June. Based upon these foresight hearings, the subcommittee also held detailed public inquiries into the adequacy and appropriateness of environmental and health programs related to both the nuclear and fossil fuel cycles. As the coal fuel cycle hearings started in July, Brown observed:

Either the CO₂-greenhouse effect or the adverse health effects of burning coal could change our decision on this basic aspect of President Carter's program, yet at

present we do not know enough about the environmental impact of excessive coal burning to formulate a wise decision. To resolve this uncertainty, we need to have a properly developed and managed research program.

As these hearings developed, it became clear that a great deal more and better-managed research in this area was needed. It also became evident that better health and environmental monitoring systems were necessary.

COAL AND NUCLEAR FUEL CYCLE HEARINGS

The coal hearings were followed in September by nuclear fuel cycle hearings. Brown outlined the scope of the inquiry in this fashion:

The decision to defer reprocessing of plutonium will mean that we will have to look at new environmental and health problems associated with a significant increase in uranium mining and milling, treatment of spent fuel rods as waste, and even at other nuclear fuel cycles, such as the thorium cycle. We need to know how to solve these problems—to find out what changes are needed in the current research program. We also need to find out how to give these research results the proper leverage on energy policy decisions, so that we do not irretrievably commit ourselves to an environmentally unacceptable energy path.

Meanwhile, at the subcommittee's request, the Congressional Research Service was hard at work in the crash preparation of a report, published in October 1977, entitled "Environmental Challenges of the President's Energy Plan: Implications for Research and Development." This document analyzed the environmental impacts of various energy technologies on existing and proposed environmental R. & D. programs, and also evaluated environmental monitoring needs. Once the hearings had been completed, and the budgets submitted early in 1978, CRS was asked to do another analytical report, published in March 1978 and entitled "Research and Development Needs to Merge Environmental and Energy Objectives." The latest March CRS report described the Federal R. & D. response to the energy related environmental concerns, and also identified the issues and priority needs for further R. & D.

BIOMEDICAL RESEARCH

One of the newly specified jurisdictions awarded to the Brown subcommittee at the start of 1977 was "life sciences and biomedical applications." The subcommittee had good reason to tackle an important issue in this area very quickly. In order to develop recommendations for the House Budget Committee on March 15, 1977, the Brown subcommittee held a quickie hearing on March 10 to ascertain the adequacy of budget support in the biomedical research program of the National Institutes of Health. Brown touched base in advance with Representative Paul G. Rogers (Democrat of Florida), chairman

of the Commerce Subcommittee on Health and Environment, and also publicly announced that "we share jurisdiction" with the Rogers subcommittee:

We have worked cooperatively and effectively with that committee previously, and I have every intention of continuing in that cooperative mode.

After hearing Dr. Donald Frederickson, Director of the National Institutes of Health and several of his associates, Brown informed all of his subcommittee members:

Their testimony presented one basic problem with their budget. That is the shortage of certain specially trained scientists necessary to carry out research on health effects of environmental pollutants. The most critical manpower shortages are in the areas of epidemiology and toxicology.

This corroborates testimony that we have heard previously, especially at the hearings on the Effects of Chronic Exposure to Low Level Pollutants

Since OMB had cut the training programs, the subcommittee felt that increases of about \$1 million a year for training were in order, and these recommendations were ratified by the House Budget Committee. This process was repeated in 1978.

OCEAN DUMPING REVISITED

Based on the effective groundwork laid during 1975 and 1976, the subcommittee achieved another victory in 1977 with the passage of the Marine Protection, Research and Sanctuaries Act Reauthorization. The prior hearings on ocean dumping formed a useful background for consideration of this legislation, along with the House Committee on Merchant Marine and Fisheries. In 1977, the bill was sequentially referred to the Science Committee, and in following years the Science Committee was accorded joint referral. This entailed a recommendation by the Brown subcommittee on that section of the bill pertaining to oceanic research and development.

The jurisdictional relationship with the Merchant Marine Committee was not as smooth on this issue as with other cooperative relationships. Since the Merchant Marine Committee had historically handled this legislation prior to the 1974 reorganization of House committees, and had also handled the bill in 1975, perhaps it should have come as no surprise that it was referred to that committee again in 1977. With Teague in the hospital for major surgery, Brown had to carry the ball to establish the jurisdiction of the Science Committee. Teague signed a letter to Speaker O'Neill, and Brown wrote to Representative John M. Murphy (Democrat of New York) chairman of the Merchant Marine Committee—and other ranking members of the Merchant Marine Committee. They based their argument on several points: (1) the colloquy between Hechler and Mrs. Hansen during

consideration of the House Committee reform bill had established the joint jurisdiction of the Science and Merchant Marine Committees over NOAA: (2) the Science Committee clearly had legislative as well as oversight jurisdiction over oceanic R. & D. Brown also pointed to an exchange he had had in 1975 with Representative Robert L. Leggett (Democrat of California) at the time the Marine Sanctuaries bill was debated that year. In 1975 Brown had pointed out "the minor jurisdictional duplication that exists here," and Leggett had gallantly responded:

Certainly our committee is jealous of its prerogatives and jurisdiction, and I do appreciate the fact that we are encroaching in part on an active jurisdiction of the gentleman's committee. This is, as the gentleman indicated, a nominal encroachment.

But in 1977, Brown decided it was time to resist. He assured Chairman Murphy:

I have no plans to introduce a bill to authorize appropriations for Title II of the Marine Protection, Research and Sanctuaries Act.* * * I can assure you that my subcommittee does not have any interest in the regulatory or general program development activities of NOAA which fall within the jurisdiction of your committee. However, I do believe that where such programs or statutes involve environmental research and development activities, it is within the purview and responsibility of this committee to take an active legislative and oversight responsibility.

VICTORY FOR THE SCIENCE COMMITTEE

Speaker O'Neill, in granting sequential referral of the bill to the Science Committee, recognized the legitimate jurisdictional interest in the oceanic R. & D. But Chairman Murphy and the Merchant Marine Committee continued to insist that the Science Committee had only oversight, and not legislative jurisdiction. To emphasize their point, the Merchant Marine Committee went ahead to authorize the R. & D. section as well as the regulatory sections of the bill. Both committees proceeded on a collision course. On April 7, 1977, Representative John B. Breaux (Democrat of Louisiana) chairman of the Oceanography Subcommittee of the Merchant Marine Committee—wrote to Teague reiterating his conclusion that legislative jurisdiction over oceanic R. & D. remained with his committee, adding:

I look forward to receiving any comments your subcommittee may have on our "ocean dumping" act, and I will personally assure you that such recommendations will receive full and serious consideration in any legislative actions which my subcommittee will take.

Brown would not sit still for that response, and he went right on to put the oceanic R. & D. recommendations through his subcommittee, and on to the full committee. Even though the subcommittee recommended the same amount as had the Merchant Marine Committee for oceanic R. & D., Brown was anxious to preserve

jurisdiction. When the full committee took up the bill on May 19, Wydler successfully sponsored an amendment to authorize EPA to conduct research on ocean waste disposal in the New York bight, for which EPA was given \$500,000. Brown wisely chose to let his subcommittee staff director, Spensley, negotiate a compromise with the Merchant Marine Committee for which he had worked during the previous Congress. Thereafter, the Wydler amendment was unanimously adopted, and also accepted by the Merchant Marine Committee and the conference committee.

The floor debate on October 14, 1977, revealed none of the behind-the-scenes jurisdictional fight or staff negotiations which had preceded. The bill itself passed the House by 359 to 1. Included was a significant provision to set a mandatory deadline of December 31, 1981, for ending the ocean dumping of sewage sludge. The President signed the bill into law on November 4, 1977.

By 1978, the jurisdictional brush had been forgotten. A similar bill, even though it did not actually pass in 1978, was jointly referred to the Science and Merchant Marine Committees. Although nothing was said during the House debate by the Merchant Marine Committee about the spirit of cooperation between the two committees, Brown was effusive in his remarks:

This bill shows how well committees of this House can work together. *** It is a particular pleasure to bring legislation before the House which bears the stamp of two committees and be able to say that each committee has made significant improvements on the original proposal and that both committees mutually support the work of the other. *** Today, in the spirit of friendly cooperation and coordination, we are offering a joint committee amendment in the nature of a committee substitute which incorporates the best of both versions.

CLIMATE RESEARCH

Building on the initiative by Hayes in 1976, Brown moved in late 1976 to push forward legislation to establish a national climate program. As a member of the House Agriculture Committee and representing a district with a great deal of farming, Brown explained:

This was motivated by a perception of the enormous potential savings in disaster relief and lost agricultural production which could be achieved by a better understanding and monitoring of climate fluctuations.

Brown outlined his plans in a letter to President-elect Carter, and in January 1977, met with representatives of the transition team. He then invited all agencies concerned to contribute to the program development, and to designate suitable liaison staff. Spensley recalls:

We were invited down to meet with some of the members of the President's Office of Science and Technology Policy. George Brown, myself and a couple of other staff members went down and met in the Executive Office Building. *** And, lo and behold, one of the staff members we met with went straight to OMB and got them to write a letter in opposition to our initiative.

But subcommittee efforts went forward to line up support for the bill, and Brown received good support later from OSTP Director Frank Press. On March 22, 1977, Brown hosted a roundtable, informal meeting, at which representatives of about a dozen Federal agencies were present. Brown told the roundtable participants:

Having barely survived the winter of '77, it is perhaps dwelling on the obvious to relate to you the importance of climate research and information to assist us in anticipating and avoiding the adverse impacts of climate fluctuations. At best, our present knowledge and forecasting technology do not enable us to make weather predictions much more than several months in the future. Clearly, there is a need for better cooperation and integration of the various ongoing climate programs and experiments in order to maximize our research efforts and outputs.

ENLISTING ADMINISTRATION SUPPORT

At both the roundtable and later sessions with Federal agencies, Brown repeated that the subcommittee wanted to accommodate administration concerns as much as possible in any final legislation. The staff fanned out to talk with numerous agency representatives. For example, Dr. Byerly reported that the Department of Agriculture was very concerned lest the security of its system of making crop predictions might be breached by speculators in crop futures. These fears were allayed by including a clause in the bill to continue the predictions and assessments by mission agencies in accordance with their existing procedures.

Prior to opening three days of public hearings on April 4, Brown learned of a distressing development. He immediately informed Teague:

Despite steady support from administration representatives, we understand that someone at middle-level review in OMB has instructed agencies to testify unfavorably on the bill in hearings April 4, 5, and 6. We think that this is a serious mistake, and will only serve to break down constructive lines of communication established over the last few months. There is wide public and congressional support for a climate program, and the key to making it effective will be joint cooperative congressional-administration effort.

GOBBLEDYGOOK

Dr. Robert M. White, a highly respected meteorologist who was Administrator of NOAA, was directed by OMB to testify against the bill, despite the fact that he felt very strongly in favor of greater emphasis on climate in Federal programs. Dr. White negotiated a statement out of the administration which did not outwardly oppose the legislation, but did not support it either. Small wonder that Winn needled him by labeling his statement "gobbledygook." Winn rubbed it in:

It is very vague. It is not your usual stellar presentation with facts and figures. * * * I kept waiting all the time for you to tell us what we are going to do. What are we going to do besides coordinate, cooperate?

It was a cat-and-mouse game for the subcommittee to try and pry from administration witnesses positive indications of support for the pending legislation. Responses were in terms of asserting that there was already authority in existing law, that an interagency committee existed to do what the bill envisaged—albeit a somewhat toothless committee. Brown's strategy was to call witnesses not only from Federal agencies, but also panels of users of climate information and services, international experts, and private climatic consultants.

Based on information gleaned during the hearings, Brown and his subcommittee redrafted their legislation and marked it up at the end of April. Even though it still did not have the administration's full blessing, lots of suggestions for amending the legislation came in. Brown remarked to his subcommittee that one of the reasons for this was that the subcommittee was really running ahead of the administration in its thinking. He discussed the many precautionary flags of delay run up by the executive branch, and advised:

I am not really inclined to feel that we ought to delay indefinitely while the administration gets its act together.

COORDINATION AND LEADERSHIP

By the time the bill came up for debate in the House on September 9, the structure and details had been further perfected. The legislation authorized \$50 million to establish a national climate program to monitor the climate; carry forward climate research; make future estimates; assess the impact of climatic changes on agriculture, energy use, water resources, human activities, and other factors; and disseminate the information generated. The bill emphasized that the aim was coordination, not simply to create a repository of data.

Flexibility was allowed for the President to designate a "lead agency" to give central focus to the program, even though it was pretty well assumed the President would select NOAA (which he did). By the time the bill reached the House floor, Brown could term it "a well-refined and fully developed charter for a comprehensive national program on climate."

When he presented the bill to the House on September 9, 1977, Brown knew how to attract the attention of his listeners:

I know that you and all of our colleagues remember the barges frozen in the Ohio River—barges carrying the heating oil that was desperately needed to keep factories open and homes warm. I know you all remember the plants that were shut down for a lack of natural gas in the East, while at the same time there was natural gas available in other parts of the country.

John O'Leary, Administrator of the Federal Energy Administration, testified this spring in hearings before our committee that we could have saved many millions perhaps billions of dollars last winter if we had had better generalized climate information in advance

Brown also touched on the administration opposition to the bill and its reasons, concluding:

If the administration had a vigorous, well-coordinated climate program, their opposition would have to be very seriously considered. However, in view of the situation that exists in fact, I think it is totally appropriate for us to go ahead and pass this bill instructing them on how to carry out this program.

SCIENCE COMMITTEE TAKES THE LEAD

In his remarks to the House, Walker elaborated on this point. He pointed out that despite the existence of authority, "the administration has done nothing to utilize that authority." He therefore concluded:

We believe that Congress can and must play its constitutional role by providing specific instruction to the executive branch of Government. Our action will show our determination that the past will of the Congress, expressed in past authority granted, begins to be exercised.

One of the skeptics was Representative Robert E. Bauman (Republican of Maryland). He averred that with summer drought and 27 to 30 inches of ice on Chesapeake Bay, "I do not think there is one thing the Congress of the United States could have done to prevent those catastrophes." He said he always got good responses from farm audiences when he proclaimed:

If the Congress of the United States ever gets the power to control the weather, they will screw that up too.

The bill passed the House by 282 to 60. But the Senate did not act until April 24, 1978, passing a bill which was considerably broader and less detailed. Obviously, the administration had prevailed on the Senate Committee to give more leeway to the executive branch. Having spent several years to develop thorough expertise in the field, the Brown subcommittee knew precisely, in Spensley's words, "what they had done, what they could do, and what they were willing to do." The conference committee resulted in a 50-50 compromise which the conferees of both House and Senate could support, but which was weaker than the House version. The conference report went through the House without opposition on a voice vote. Because of the power of the congressional and public support, the administration swung around to get on the bandwagon, and the President signed the bill on September 17, 1978.



Representative George E. Brown, Jr. (Democrat of California) reviews with President Jimmy Carter the text of the National Climate Bill which the President signed on September 17, 1978.

FOLLOWING UP TO IMPLEMENT THE CLIMATE BILL

The bill included provisions for both international cooperation and an intergovernmental program. These two aspects personally interested Brown. He realized global information was needed to develop climatic data in the United States, and he knew that this would be useful for all nations to have. In a private note to Frank B. Moore, the President's Assistant for Congressional Liaison, Brown on the day after the passage of the conference report suggested that the President should be aware of "the possibilities for international cooperation in understanding climatic change and its possible impacts." Writing to Secretary of Commerce Juanita Kreps on October 25, 1978, Brown noted:

I would emphasize the importance of the Intergovernmental Program as a two-way channel—for delivery of services and for feedback from users.

The administration had never been enthusiastic about helping the States set up climate programs, and had indeed fought specifically against that provision in the Senate. Once the bill became law, the administration continued to fight against some of its provisions.

In his letter to Secretary Kreps, Brown also stated:

I see climate services and impact assessments (as described in the various reports accompanying the legislation) as the real areas of pioneering in this Program. It is a chance to use technology to increase the socioeconomic resilience of our society

Passage of the national climate program legislation was another unique example of initiative by the Science Committee in impacting public policy. The challenge of effective oversight in this and other areas passed from Brown to Ambro at the opening of 1979.

OCEAN POLLUTION BILL

In June 1976, sewage, plastics, and balls of tar rolled up onto the ocean beaches of southern Long Island, forcing their closing. Periodically, oil spills and fish kills have threatened to create marine deserts in various areas. Meanwhile, billions of tons of chemical compounds, industrial wastes, and sewage are unceremoniously dumped into the oceans on which human beings rely for food, recreation, and transport.

The Brown subcommittee began to approach this problem initially from the narrow standpoint of oil spills, and the development of recovery technology as outlined in legislation introduced by Representative Robert W. Edgar (Democrat of Pennsylvania). In June 1977 the subcommittee had two days of hearings on oil spills. On August 2 and 3, 1977, the subcommittee broadened its inquiry to cover environmental research and development concerning the oceans. The subcommittee turned to experts like Dr. Ferris Webster of the Woods Hole Oceanographic Institution, who was chairing a study by the National Research Council to examine the health and vitality of NOAA's ocean R. & D. program. Six other prominent oceanographers from different institutions analyzed the scope and quality of NOAA's research efforts, with prescriptions for improvement.

POLLUTION AND ADMINISTRATIVE CONFUSION

The subcommittee discovered that 54 separate Federal entities were involved in ocean pollution-related research, development, and monitoring—including 8 Cabinet Departments, 9 independent agencies, and 37 other units of government. Meanwhile, the Senate Commerce Committee was warring with the Public Works Committee over jurisdiction, and there was the customary tussle between the Oceanography Subcommittee of the House Merchant Marine Committee and Brown's

subcommittee. At times, there was a question of which was worse, the administrative and legislative confusion or the ocean pollution. It was a major challenge which fortunately enlisted the talents of those who were determined to find a solution rather than to continue the fruitless infighting.

The central thrust of the subcommittee effort was to insure that there was a lead agency which could provide coordination, develop a 5-year plan, set priorities and then furnish the leadership to move toward the goals established. At the full committee markup on September 20, 1977, Spensley explained that a Senate bill would be used as a markup vehicle so that when it was sent back to the Senate it would minimize the jurisdictional problem on that side of the Capitol.

Between the fall of 1977 and the following February, a compromise was worked out with the Merchant Marine Committee. Agreement was reached to join in supporting a new substitute bill which was brought up for debate on February 28, 1978.

SETTING PRIORITIES

The legislation designated NOAA, as the lead agency, to prepare a 5-year plan in conjunction with the Office of Science and Technology Policy. The plan included an assessment of programs, and a setting of priorities. Brown told the House:

Since the plan must be revised biennially, it will also force the Administrator and other Federal officials to keep abreast of developing technology in the fields of ocean pollution and marine resource utilization.

The initial annual pricetag was \$5 million, much of which was to be used for grants to institutions with expertise in marine environmental matters. Forsythe, as a member of both the Science and Merchant Marine Committees, praised the legislation as representing a "strong and fully supportable compromise between the interests of the two committees." Wydler, representing the coastal area of southern Long Island especially concerned with the effects of ocean pollution, particularly noted the two phases of the bill which set priorities and made available the results of the R. & D. He mentioned that too often in the past research had been carried out because of parochial interests "or because a particular scientist was a master of grantsmanship." In a colloquy with Brown, Wydler also established the relationship of the ocean pollution R. & D. with the previously passed ocean-dumping legislation, particularly as it applied to the New York bight area.

In his concluding remarks to the House, Brown said that the bill represented an effort "to deal with the kind of problem that is be-

coming all too typical in the Federal Government, and that is a problem which cuts across several jurisdictions, generally including several committees in the Congress." Brown told the House:

What we have attempted to do here is to say to all the different agencies that are involved with the problem of ocean pollution: "We want you to get your act together. We want you to develop a common plan, a common set of priorities, and we want you to attack this general problem with your respective resources in accordance with a common set of parameters which will solve the problem with a minimum cost to the taxpayer and in a fashion that will be the most effective."

The House adopted the bill by voice vote, and after the Senate acted in April, the President signed the legislation on May 8, 1978.

JURISDICTIONAL CONFLICT WITH MILFORD SUBCOMMITTEE

As noted in chapter X, the Antarctic Conservation Act of 1978 was also passed as a result of action by the Brown subcommittee in cooperation with the Merchant Marine and Fisheries Committee. In 1977, the subcommittee held a two-day briefing, at which various NOAA officials testified, including the Director of the National Weather Service. It seemed inevitable that a conflict would arise between Milford's Subcommittee on Transportation, Aviation and Weather and the Brown Subcommittee on Environment and the Atmosphere. This conflict came to a head over how to divide up the functions of the National Weather Service. As noted in chapter XVI, the Milford subcommittee reported legislation, which eventually passed the House, providing a new statutory charter for the National Weather Service. Although he would have preferred to wait until broader legislation was ready, with a new organic act for NOAA (including the National Weather Service), Brown did not oppose the Milford bill.

On April 14, 1978, Milford and Brown negotiated a signed agreement delineating their respective subcommittee jurisdictions. Generally, it authorized the Milford subcommittee to hold hearings for an organic act for NWS, including how NWS should be integrated most effectively with the remainder of NOAA. The Brown subcommittee was then authorized to hold hearings on an organic act for the remainder of NOAA, including how the remainder of NOAA should be integrated most effectively with the NWS.

NOAA ORGANIC ACT

In April and June, the subcommittee started hearings on the NOAA Organic Act, based on legislation which had been introduced by Representative John M. Murphy (Democrat of New York). The Murphy bill was heavily slanted toward a national oceans policy, so the first job of the subcommittee was to broaden the bill to include

environmental and atmospheric considerations. These discussions proceeded during the time the President was considering the establishment of a Cabinet Department of Natural Resources. The Merchant Marine and Fisheries Committee was strongly advocating an independent oceans agency.

An informal agreement was made with the Merchant Marine Committee that they would look at the oceans side of NOAA, and the Brown subcommittee would handle the atmospheric and general environmental issues. It was apparent that the problems involved a wide variety of agencies, which were inhibited from free expression by administration policy, and it was evident that the questions could not be resolved overnight. David D. Clement ably assisted in the extensive staff work on the NOAA organic act.

WORKSHOPS: AN INNOVATIVE CONCEPT

During the summer Brown's staff held extensive discussions with representatives of NOAA, the National Advisory Committee on Oceans and Atmosphere, the American Meteorological Society and the National Academy of Sciences. Out of these discussions and with the collaboration of the Senate Commerce Committee the staff developed an innovative approach: two "workshops," at which free-wheeling opportunities were provided to thrash out how best to reach certain goals. Brown enthusiastically endorsed this approach, scheduling working sessions at which people got a chance to present their professional points of view rather than parroting administration policy.

In October 1978 the first two-day workshop was held at the offices of the American Meteorological Society in Boston, where 35 representatives of 9 Federal agencies came together for frank, open forum discussions and recommendations. Brown outlined the objective of the first workshop:

Perhaps the most significant issue which should be addressed, in light of current Federal resource limitations and of the growth of the private meteorologists' sector, is what the respective roles of the Federal government and the private sector should be in providing weather services. Another important issue is what NOAA's responsibilities for atmospheric research should be versus those of other Federal agencies such as the National Science Foundation, the Department of Energy and the Environmental Protection Agency.

The Boston workshop also discussed the relationship which should exist between NOAA and the atmospheric sciences academic community. Several discussion leaders in the field, eminent university scholars in their own right, presented position papers to help focus the discussions. The second workshop was held in mid-November at the National Center for Atmospheric Research in Boulder, Colo. There only a limited number of Federal agencies were represented, primarily

as resource people. Most of the participants in the Boulder workshop were private sector meteorologists, weather service users, and experts from the academic community. Alexis J. Hoskins furnished valuable staff assistance in insuring the success of the workshops.

The experience was a healthy one. It enabled many new ideas to surface, and old problems among agencies to help solve themselves. By getting away from the formal atmosphere of a committee hearing, everything came out on the table. Brown, always an innovator, was delighted with the results of the workshops. All too frequently the measuring rod for congressional success is whether legislation is passed and in that sense NOAA's organic act was not developed and enacted in 1979. Yet richer dividends resulted from the time and effort invested. The channels of free and frank communication were opened, there arose a new understanding and appreciation of different missions and different points of view, the yeast of new ideas germinated, and what were once glacial jurisdictional problems began to melt. Perhaps the most exciting result of the workshops was the fact that NOAA and the administration started making proposals to the subcommittee to do some of the things which had been concluded they ought to do. As described by Spensley:

It was a feedback of some of the things that came out of those workshops.

EPA AUTHORIZATION IN 1978

By 1978, the subcommittee had reached a level of sophistication in assessing the programs of EPA. Also, the parliamentary situation was smoother in 1978. Up to that year, the Senate had authorized R. & D. for EPA in a fragmented fashion, tied to the numerous acts which constituted different programs, from safe drinking water to toxic substances. But by 1978, the Senate had agreed to include all EPA R. & D. in one bill.

Brown was also able to report to the full committee on March 14, 1978:

The EPA in the past has been troubled by a lack of credible research and development. Our subcommittee has gone into some of the problems in the past during our oversight activities, and has pointed out some of the difficulties in the research program.

We feel that as a result of the committee's activities and the aggressive leadership of the new administration, the EPA research and development program is showing signs of improvement and we hope to be able to continue that improvement with the authorization levels contained in this bill.

Brown told the committee that although the President had asked for an increase of 12 percent for the entire EPA operation, he was disappointed with the R. & D. recommendations:

The research and development budget got the short end of the stick in these recommendations, with only a one percent increase.

The subcommittee proceeded to correct these deficiencies. The final legislation also provided authorizations for \$30 million in programs for which no request had been made, including:

- \$7 million for grants for long-term programs at universities;
- \$3 million to support the Gulf Coast Air Quality Study;
- \$2 million for coordination of environmental research;
- \$3 million in grants for studies by public interest groups; and
- \$15 million for technologies for reusing wastewater.

The Gulf Coast Air Quality Study had interested the subcommittee as a result of special urban air pollution oversight hearings in Denver and Houston in November 1977. The conference committee produced a little of a tussle over the Senate-recommended section on grants for public interest groups. The House conferees pursued their traditional opposition, followed by severely limiting the nature of the eligible groups before agreeing to the proposal. The House conferees won the addition of \$4 million for groundwater R. & D., an item of particular concern to Ambro and Watkins.

RELATION OF R. & D. TO ENFORCEMENT

When he presented the bill to the House on April 27, 1978, Brown declared:

The Agency's abatement and enforcement activities touch every facet of American society. Occasionally, that touch has been rather clumsy. * * * A significant fraction of EPA's problems in the past have been caused by a lack of credible information. * * * However, I feel we are making progress. In recent years, EPA's Office of Research and Development has received extensive oversight. Although they still have far to go, the research program does show signs of improvement.

Walker endorsed Brown's approach, adding:

Many of our colleagues have complained that EPA regulations have not always been fully documented in the past. It is the hope of the committee that the funds provided in this bill will assure that future EPA regulations are based on all necessary R. & D.

Winn, Wydler, and Hollenbeck also endorsed the legislation. The only strongly negative note raised in the House in 1978 was sounded by Representative John H. Rousselot (Republican of California), who bluntly charged:

Just in case anybody believes that everyone here thinks this is a great Agency, I rise to say that it is not. Instead of authorizing it for another year, we ought to be abolishing it.

But when the roll was called, the committee's unanimous vote of support was influential, and the bill was passed, 397 to 33. The conference report fared even better on October 4, 1978, winning by 387 to 15.

It was characteristic of the subcommittee to follow up through oversight and "foresight" hearings on the legislation which was passed or planned. Sometimes the subcommittee launched inquiries to avoid the necessity for future legislation.

After passage of the National Weather Modification Act of 1976, the subcommittee followed closely the progress of the Weather Modification Advisory Board which the law established to recommend a policy and research program. In October 1977, and again in May 1978, the subcommittee held hearings to receive progress reports. The subcommittee helped formulate legislation to focus and strengthen Federal leadership in the weather resources management area. Spensley reported on his attendance at meetings of the Advisory Board in Atlanta, Ga., and Aspen, Colo.:

It is my opinion that the interest of the subcommittee in the deliberations of the Advisory Board and the attendance of the subcommittee staff at the meetings has added to the importance, effectiveness and timeliness of their efforts.

PROGRESS IN RESOURCE RECOVERY

In August 1978, the subcommittee published a report entitled "The Status of Resource Recovery—A Report of Site Visits." The report, prepared as a result of an investigation conducted jointly by Dr. Byerly and staff of the Environment and Natural Resources Policy Division of CRS, was based on visits to 12 resource recovery sites around the country. In his letter of transmittal to Teague, Brown termed the report a "snapshot" taken of the status of these resource recovery experiments at the time of the visits. He added:

I believe that in the future—in five or ten years—economics will favor resource recovery and source separation much more than now. In large part this change will occur because the closing of dumps and the upgrading of landfills (in response to the Resource Conservation and Recovery Act of 1976, P.L. 94-580, and other environmental laws) along with citizen pressure will force communities to reevaluate their solid waste management schemes to minimize disposal (i.e., burial or simple incineration).

Brown tempered the overoptimistic assessments of resource recovery with a tinge of realistic warning, in concluding that "the technologies for resource recovery need further development." Quite naturally, those with an interest to promote were critical of the tone of the report, while others praised it as "an honest job of reporting." Frank Kuchta, Director of Public Works, City of Baltimore, Md., testified on September 20, 1979 that the report was "one of the clearest, most intuitive analyses of the project." He termed it "probably one of the most useful reports that any city or county could have in considering various existing technologies to reduce solid waste volume and produce energy."

CRS also assisted in the preparation of a report on "Water Quality Research," which the subcommittee published in January 1978. It

was based on hearings which the subcommittee had held in the fall of 1976, dealing primarily with municipal wastewater treatment R. & D. In transmitting the report, Brown mentioned:

It is my intention that our subcommittee delve more deeply into environmental research related to water quality, sewage treatment, groundwater, drinking water and related topics.

GROUNDWATER R. & D.

Ambro and Watkins were especially interested in groundwater improvements. In June 1977, four of the seven water wells in Glen Cove, N.Y., were closed by the Nassau County Health Department, and the Glen Cove officials turned to their Congressman, Ambro, for both help and clarification. Watkins' interest was enhanced by the fact that EPA's Robert S. Kerr Environmental Research Laboratory, their principal groundwater research laboratory, was located in his hometown of Ada, Okla.

In February 1978, the subcommittee staff organized an informal interagency task force comprised of Federal and State representatives to identify ongoing groundwater R. & D., to suggest methods for filling the gaps, and to recommend procedures and mechanisms which could be incorporated into legislation to help solve these problems. Yacov Y. Haimes, an American Geophysical Union Fellow working with the subcommittee, helped sparkplug the task force work.

Ambro presided over field hearings held in Glen Cove as a case study to investigate the groundwater problems facing many communities throughout the Nation. There the subcommittee discovered the catch-22 situation confronting a mayor whose water wells were ordered to be closed when it was discovered they had traces of trichloroethylene and tetrachloroethylene, possible carcinogens. Hon. Vincent A. Suozzi, mayor of Glen Cove, told the subcommittee:

We're not quite sure how much of these two substances the water in these four wells contains because tests of water samples continually turn up different levels. We're not even quite sure what levels of these two substances might be dangerous or even how dangerous these substances could be because the State, the Federal Government, and private organizations can't seem to agree on either of these two factors.

Later in April, the subcommittee solicited agency comments on the need for more groundwater R. & D. at two days of hearings. Along with the hearings, the subcommittee sponsored a workshop which included groundwater experts representing nine Federal and State agencies, a trade association, a consulting firm and the university community. The workshop also zeroed in on possible legislation, which served as a lever to get the various agencies to talk frankly and informally with each other—much as they had with the proposal for the NOAA organic act. It soon developed that a form of coordination began to appear even without legislation, as the principals from the various agencies began to interact personally.

OTHER ACTIVITIES OF BROWN SUBCOMMITTEE

Among the other activities of the subcommittee were the following:

- Hearings during July 1977 to determine what lands are available for environmental research reserves, how they are managed, and what protection they have against being put to other uses.
- Oversight hearings, in June 1978, on "Environmental Responsibility Within the Department of Energy." In a letter of transmittal, Brown stated: "We conclude that although the Department is trying to integrate environmental considerations into its decision-making process, there is a great variability within the Department as to the success of that effort."
- Oversight hearings on "Environmental Monitoring," held in September 1977, and June and July 1978. The purpose of the hearings was to review applicable monitoring programs, and to investigate the feasibility of developing a prototype program.
- Oversight hearings on "Interagency Regulatory Liaison Group." The Group had been formed by the President to coordinate the efforts of the Environmental Protection Agency, the Occupational Safety and Health Administration, the Consumer Product Safety Commission, and the Food and Drug Administration. This was the first time the four agencies had appeared together, as a formal group, before the U.S. Congress. They were obviously pleased at the opportunity to tell what they considered to be a "success story." One of the major findings of the hearings was the need for long-term research programs to generate sound, credible scientific information, instead of ad hoc, short-term, quickie solutions to meet regulatory needs. •

NATIONAL CONFERENCE ON HEALTH CARE COSTS

Early in 1978, the subcommittee members met and decided that the issues they considered most important all centered around the relation between the health of human beings and the environment. One of the most important initiatives in working toward this goal was the organization and planning of the "National Conference on the Environment and Health Care Costs." The conference was jointly sponsored by Brown and Representative Paul G. Rogers (Democrat of Florida). As chairman of the Subcommittee on Health and the Environment of the House Commerce Committee, Rogers had worked closely with Brown on a number of joint programs.

A coalition of interested groups helped plan the conference, which was held in the House Cannon Office Building caucus room on August 15, 1978. Participating in the coalition were the Urban-

Environment Conference, National Governors Association, Conservation Foundation, Environmental Defense Fund, United Steelworkers of America, American Public Health Association, Blue Cross and Blue Shield Association, National Health Council, and Washington Business Group on Health. The conference helped enhance public awareness of containing medical costs through preventive health care, relying in part on control of environmental factors which affect health. In opening the conference, Brown remarked:

I must say that getting two subcommittees of the Congress to cooperate is probably as hard as getting labor and management to cooperate.***

Wirth, who addressed the conference on "Legislative Response to Environmental Health Issues," stated:

This coalition can be developed in three ways: First, by advocating and supporting research. Second, by educating people to environmental health hazards. And third, by assisting us in the governmental decision-making process.

Brown also challenged the conference to work toward a new level of partnership, through a better network of communication. He also called for better data to provide for more regulatory precision. Unlike many one-shot conferences, this one proved more durable, as the coalition continued to work after the disbandment of the conference toward the goals which had been set.

ORGANIZATION MEETING

When the committee Democratic caucus assembled on February 1, 1979, for its first meeting at the opening of the 96th Congress, there was great uncertainty about both the jurisdictions of the subcommittees, the chairmen, and even how many subcommittees there would be. Since all of the final negotiations were open to the public, a visitor wandering into the huge committee room could have drawn several erroneous conclusions before the morning's organization meeting had proceeded very far. It was also obvious that almost all of the caucus members themselves were surprised by the totally unpredictable developments.

Having completed a highly successful two terms as chairman of the Subcommittee on Environment and the Atmosphere, Brown was expected to move up to a more prestigious position. Not that his subcommittee was unimportant; he had seen to that. It was just that his had been the seventh choice in 1975, and it was generally assumed that he might choose to chair one of the two very powerful energy subcommittees. This assumption seemed confirmed when Chairman Fuqua indicated near the start of the caucus meeting that Brown had been the coauthor of one of the proposals for dividing up the energy jurisdictions. Everybody on the committee and among the public onlookers

was assured this assumption was correct when McCormack stated very directly:

I want to emphasize to you that we work with the knowledge that Bob Roe was going to choose a (sub)committee in Public Works, and that George and I would be the persons drawing for these two energy committees. We have worked in total and absolute harmony and in very close communication.*** I remind you again that George Brown and I are agreed on these things.

MCCORMACK ON BROWN'S INTENTIONS

Surely McCormack wouldn't make such a positive statement if Brown hadn't indicated his choice, would he? Brown remained quiet and did not deny McCormack's firm indication of his intentions. When it came time for him to speak, Brown merely outlined in several minutes his arguments for the McCormack plan, saying nothing about his own choice. This further seemed to indicate that he was confirming McCormack's explicit analysis.

Quite awhile later, Brown rather casually made an ambiguous statement as he started once again to argue the substantive division between energy jurisdictions:

I am at this point open minded on subcommittee chairmanships. That is a decision that has yet to be made.

Once again, everybody in the committee caucus and in the committee room assumed that this rather mild disclaimer in no way refuted the contention by McCormack that Brown would choose an energy subcommittee. When Brown entered a colloquy with Harkin to determine whether automotive jurisdiction should go to the subcommittee to which Harkin aspired—Transportation—or to the conservation section of energy, then it seemed 100 percent sure where Brown was going. Brown talked about joint hearings with Harkin on automotive propulsion issues:

So you might even sit together, and we would have no problems in that sense. And we could minimize the work.

THE TITLE IS SHORTENED

Now Chairman Fuqua announced the jurisdiction of a newly named "Subcommittee on Natural Resources, Environment, and Climate." Brown jumped in to offer:

Mr. Chairman, could I suggest a shortening of the title to eliminate the word "climate"? Just "Natural Resources and Environment"?

Chairman Fuqua responded: "I think it is a good suggestion." And it was done. Now, did this mean that Brown was possibly still

interested in retaining his old subcommittee chairmanship? Nobody concluded that; he was just being helpful to the next holder of that chairmanship, most people felt. Brown then proceeded to engage in some more colloquies on how the energy subcommittees should be divided, which seemed to confirm where his interest lay.

At this point, Ottinger introduced a big clue to which subcommittee Ambro would choose. Ottinger argued strongly for a seventh subcommittee on "Investigations and Oversight." One of his principal arguments was:

In this particular case, it would mean the opportunity for my colleague from New York, Mr. Ambro, to have that opportunity.

Well, the cat was out of the bag. Everybody now knew that Brown and Ambro had their choices all ready, once the open bidding started. To confirm the assumption, Ambro made an impassioned argument for precisely the type of oversight investigations which were not only needed, but which would bring credit to the Science Committee.

THE BIDDING FOR CHAIRMANSHIPS

Now the machinery swung into action to allow the seven most senior committee members to bid, in order of seniority, for the subcommittee chairmanships of their choice. As each senior member bid, a secret ballot was taken to confirm or reject him for the subcommittee chairmanship he selected. According to prediction, Fuqua and McCormack were confirmed. Then Fuqua asked Brown to make his bid. Brown caused some laughter by stating with a straight face: "I haven't made up my mind yet." His closest associates insist that he really meant it. Then he caused gasps of surprise by casually announcing: "Science, Research and Technology." He was unanimously confirmed.

What other factors helped motivate Brown's choice? First, the scientific community strongly urged Brown to take over the S. R. & T. chairmanship. Second, Chairman Fuqua also prevailed on Brown to make that choice.

AMBRO CHOOSES NATURAL RESOURCES

When the bidding got down to Lloyd of California, he occasioned a mild surprise by choosing "Investigations and Oversight." In past years, the most recently created subcommittee was generally left until last by those choosing subcommittee chairmanships. This left it up to the No. 7 in seniority, Ambro, who asked in a somewhat forlorn tone of voice: "What is left, Mr. Chairman? Natural Resources?"



Representative Jerome A. Ambro (Democrat of New York), right, chairman of the Natural Resources and Environment Subcommittee, with other full committee members and staff inspecting the Isabelle Project at Brookhaven National Laboratory on March 15, 1979. At left (with polka dot tie) is Representative Manuel Lujan, Jr. (Republican of New Mexico), and at center (with name tag) is Representative Allen E. Ertel (Democrat of Pennsylvania). Also in photo at right are Stephen J. Lanes, staff director of Subcommittee on Energy Research and Production, Chairman Fuqua, and Representative Doug Walgren (Democrat of Pennsylvania), partially hidden to left of Fuqua.

As Ambro took over the reins from Brown at the start of 1979, the new jurisdiction of the "Natural Resources and Environment" subcommittee was defined as follows:

Legislation, and other matters relating to natural resources, including, but not limited to, materials R. & D. and national materials policy, water research, and, to the extent appropriate, agriculture R. & D.; legislation and other matters relating to environmental research and development activities of the Environmental Protection Agency, environmental, health, safety, life sciences and biomedical activities of the Department of Energy; operational research and development activities related to the atmosphere (including meteorology, aeronomy, climate, weather modification) and those ocean R. & D. activities related to the quality and management of the environment of the National Oceanic and Atmospheric Administration.

Obviously, the jurisdiction had been expanded, primarily with the addition of materials policy, which had been under the umbrella of the Science, Research and Technology Subcommittee; through the assignment of all of the aspects of weather, except aviation-weather services, which remained in the Transportation Subcommittee; and by more explicit spelling out of the numerous fields in which the old Brown subcommittee had built expertise during the prior four years.

NEW MEMBERS OF THE NATURAL RESOURCES SUBCOMMITTEE

At the start of 1979, the following were members of the Natural Resources and Environment Subcommittee:

Democrats

Jerome A. Ambro, New York, *Chairman*
George E. Brown, Jr., California
James J. Blanchard, Michigan
Stanley N. Lundine, New York

Republicans

Robert S. Walker, Pennsylvania
Donald Lawrence Ritter, Pennsylvania
Edwin B. Forsythe, New Jersey

Ambro, a big, balding, friendly man with an explosive sense of humor, a colorful speaker, and a master politician from a traditionally Republican area, was first elected to the House of Representatives with the Watergate Class of 1974. He had served as the town supervisor of Huntington, N.Y., and was an aspirant for the lieutenant governorship nomination in 1970. In 1974, Ambro upset an incumbent Republican Congressman who had been indicted for conspiracy and although acquitted still carried scars of the trial. Ambro has successfully survived through hard political work, delivering projects, and good constituent service as well as a vigorously independent attitude which has kept his popularity at the polls over the 50-percent mark. In Presidential elections his district goes Republican at the same time it is supporting Ambro. As a subcommittee chairman, Ambro is more of an activist who looks for the main chance.

Ambro chose as his subcommittee staff director Australian-born Dr. Ian W. Marceau, who had served for a year as Ambro's director of environmental protection at the time Ambro was town supervisor of Huntington, N.Y. For nearly two years before joining the committee staff, Marceau had been director of the New York State Assembly science and technology staff. With two degrees in agricultural economics from the University of Sydney, he was awarded a Ph. D. degree at the University of Illinois with a major in resource economics.

The first order of business facing the Ambro subcommittee was the new authorization on R. & D. for EPA in 1979. Following February hearings, the subcommittee reported to the full committee on March 15. One of the points which Ambro made to the full committee was this:

A major subcommittee concern has to do with the nature and content of the health effects research. The subcommittee is concerned that too much emphasis has been placed on identifying new potential hazards and not enough emphasis on removing the uncertainties. * * * The subcommittee does also recognize the serious public concern over the large number of hazardous waste sites being identified across our Nation. For that reason, the subcommittee has directed that funds be made available for a special study of the hazardous waste disposal. This will be conducted by the National Academy of Sciences.

The subcommittee also voted a \$5.25 million increase for R. & D. in groundwater and drinking water. The subcommittee's recommendations unanimously cleared the full committee on March 15, and Ambro presented them to the House on March 26. The EPA R. & D. bill carried by a voice vote, as did the conference report on November 29, 1979.

As an aftermath of the passage of the EPA R. & D. authorization bill, the House Appropriations Committee made some deep cuts, two of which Ambro attempted to restore on the House floor. He presented an amendment on June 22, 1979, to restore a \$4 million cut in groundwater R. & D., plus \$6 million for "anticipatory research" (in an attempt to avoid the "crisis of the week" approach which all too often characterized unplanned actions). Representative Edward P. Boland (Democrat of Massachusetts), chairman of the appropriations subcommittee, rallied his fiscally responsible troops with the argument that a great deal of uncoordinated groundwater research was going on in other agencies, and that it would be better to stick to the amount requested by EPA for anticipatory research. The economy mood of the House resulted in a rejection of the Ambro amendment by a vote of 237-129. A number of committee members voted against the Ambro amendment, including McCormack, Mrs. Bouquard, Glickman, Volkmer, Mavroules, Nelson, Hance, Winn, Lujan, Kramer, Davis, Roth, and Ritter.

OTHER ACTIVITIES

A follow up and reauthorization of the "National Ocean Pollution Research and Development and Monitoring Planning Act" was approved by the House on May 14, 1979, with the participation of the



Representative Ken Kramer (Republican of Colorado).



Representative Robert W. Davis (Republican of Michigan).

Ambro subcommittee. As in prior Congresses, this legislation was worked out in collaboration with the Merchant Marine Committee. The President signed the legislation on June 4, 1979.

At the end of February 1979, the Ambro subcommittee held a joint hearing with the Ottinger Subcommittee on Energy Development and Applications to review the environmental sections of the Department of Energy authorization bill. In marking up that portion of the DOE bill, the Ambro subcommittee made only minor changes in the President's budget request. More emphasis was placed on the internal management of the program to measure the health effects of low-level ionizing radiation. The full committee approved the subcommittee's recommendations.

In the early months of 1979, the Ambro subcommittee continued to build on the oversight and foresight work of its predecessor, the Brown subcommittee. At times the agencies were slow to respond to the many requirements for reports and coordination which they had been mandated to accomplish. This necessitated some strenuous clean-up work by members and staff of the subcommittee.



Representative and Mrs. James J. Blanchard (Democrat of Michigan). Representative Blanchard serves on the Subcommittee on Natural Resources and Environment.

Epilogue

FUQUA AND THE FUTURE

On January 23, 1979, the caucus of all Democratic Members of the House of Representatives decided by a secret ballot vote of 235 to 10 that Florida's Representative Don Fuqua would become the fourth chairman of the Science Committee. There were only three committee chairmen given a higher number of votes (the most being 238) at the start of the 96th Congress. The House made it official January 24.

At age 45, Fuqua was the first of the four Science Committee chairmen to be born after World War I, as well as the first to become chairman before the age of 60. Teague had already finished at Texas A. & M. before Fuqua was born. The following table gives a comparison of the relative ages of the four committee chairmen:

Chairman	Year of birth	Age became chairman	Congressional term when elected chairman
Brooks	1897	61	12th
Miller	1891	70	9th
Teague	1910	62	15th
Fuqua	1933	45	9th

AN ACTIVE APPRENTICESHIP

Fuqua had served an active apprenticeship on the committee, chairing the following subcommittees since his fifth term starting in 1971: International Cooperation in Science and Space, Manned Space Flight, Oversight, and Space Science and Applications. Although both Brooks and Miller had taken brief flings at handling minor subcommittees at the same time they chaired the full committee, Fuqua was the first chairman to choose to head up a major subcommittee at the same time he piloted the full committee. He decided in 1979 to retain his chairmanship of the Subcommittee on Space Science and Applications (handling all of NASA's activities except aeronautics), a post he had held since 1975.

The circumstances of Teague's severe illness in 1977, when he was confined to the Naval Hospital in Bethesda for major surgery, gave Fuqua the experience of presiding at full committee sessions during Teague's absence for several months.

The days of ironfisted committee chairmen who imposed their personal will over the grumbling protests of their committee members are probably gone forever. Fuqua fits well into the modern mold of a chairman whose power and influence spring from creating a democratic consensus within the committee. Observers at the organization meeting of the committee in February 1979 were struck by the fact that Fuqua made his personal preference clearly visible in advance and argued for jurisdictional responsibilities for the energy subcommittees which committee members then proceeded to vote down. The votes were close, there was no rancor, no "hit list" was compiled for later retributions, and the business of the committee went along smoothly without the issue being raised again.

EMPHASIS ON SUBSTANTIVE ISSUES

At the same time, Fuqua had an interest in a number of substantive issues which he encouraged the committee to emphasize. He has exerted leadership in expanding the committee's activity in materials policy, space industrialization, solar-powered satellites, and commercialization of Earth resources information. Fuqua also has helped sponsor overall reviews of all Federal R. & D. programs, as well as the first major review of the National Science Foundation in over a decade. He has taken a particular interest in more rigorous oversight in the construction field, somewhat pushed to the background by the more glamorous fields of operational R. & D. which attract more headlines. In 1978, Fuqua carried the ball for freedom of research in connection with recombinant DNA (see chapter XII).

Fuqua's interest in international relations manifested itself not only in sponsoring an oversight trip to Europe, and encouraging members to visit Mexico in the spring of 1979, but a personal role in helping push the Institute for Scientific and Technological Cooperation. He testified before the House Foreign Affairs Committee in support of the latter program, involving an emphasis on transferring "appropriate technology" to underdeveloped countries along grassroots lines originally formulated by the late Vice President Hubert H. Humphrey. In August 1979 Chairman Fuqua led a delegation of seven committee members attending the United Nations Conference on Science and Technology in Vienna.

INTEREST IN SYNTHETIC FUELS

Working closely with House Majority Leader Jim Wright, Fuqua has stressed the development of synthetic fuels and has pressed for greater congressional initiative in this area. In June 1979, he

expressed his strong support for President Carter's plan to accelerate the development of solar energy and other renewable energy sources.

At the start of 1979, when the House leadership was anxious to schedule legislation for floor consideration during the early months—when most committees had not yet gotten underway—the Science Committee in March brought five bills to the floor: the NASA, EPA, NSF, and FAA authorizations and a \$185 million supplemental authorization for the Space Shuttle. Unlike Presidents, new committee chairmen are not customarily accorded a “honeymoon” during which the opposition stays muted. But Fuqua put his Science Committee legislation through the House with very little trouble, only a couple of months after he had become the chairman of the committee.

SPEEDY ACTION ON SCIENCE COMMITTEE BILLS

It took only a few minutes for the \$75 million FAA R. & D. authorization to go through under suspension of the rules by voice vote on March 26. On March 27, the House passed by voice vote the \$381.3 million EPA authorization. The billion dollar NSF authorization passed the same day by a voice vote, after sustaining a \$14 million cut on the House floor.

Fuqua was concerned about both the \$4.76 billion NASA authorization, and the \$185 million supplemental funding for the Space Shuttle. Yet both passed on March 28 by votes of 323 to 57 and 354 to 39.

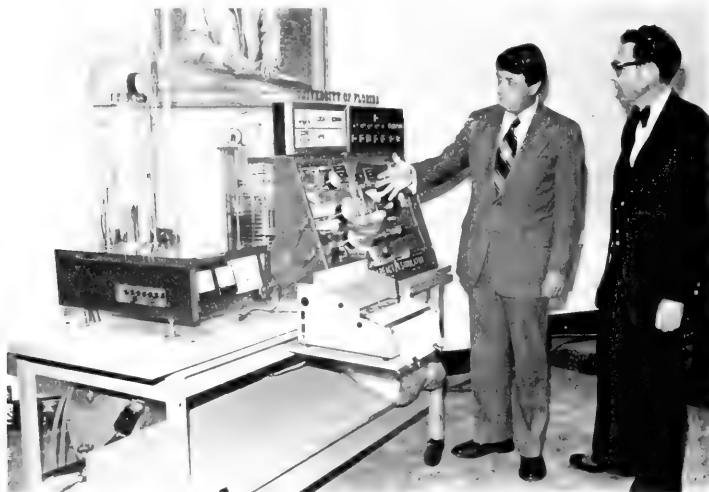
On jurisdictional issues, Fuqua differed markedly from the philosophy and mode of operation of any of the three preceding chairmen. On relations with other committees, Brooks and Teague were inclined to fight and maneuver to expand the committee's jurisdiction, while Miller retreated somewhat passively. Fuqua's approach has resulted in much fewer high decibel confrontations than in past years. In describing his relationship with the Armed Services, Interstate and Foreign Commerce, and Interior and Insular Affairs Committees, Fuqua reflected:

We have no problem with Armed Services Committee. Dingell and I sat down first, and then we sat down with Udall and agreed that we were going to work together. We got the staff together and repeated that “we're going to work together.” And I think it has been very, very good. Last year it was just everybody at each other's throats—trying to assume original jurisdiction.

When the House debate opened on the Department of Energy authorization act on July 26, 1979, Fuqua was able to report to the House:

The work has been broader than our committee because the Department of Energy has other functions to perform which are handled by the Committee on Interstate and Foreign Commerce and the Committee on Interior and Insular Affairs.

Mr. Dingell and Mr. Udall and their staffs have been most cooperative in working with us and the fruits of our labors are reflected in the fact that there are no disagreements between the committees in the bill before us today.



Chairman Fuqua inspects see-through nuclear reactor with its inventor, Professor Glen J. Schoessow of the University of Florida (right). At the chairman's invitation, Professor Schoessow demonstrated the reactor to the committee during a special hearing.



Mrs. Don Fuqua, Dr. W. R. Lucas, Representative Fuqua and Gerald E. Jenks (minority staff), at the Marshall Space Flight Center.



Chairman Don Fuqua addresses remarks during a committee field trip to Marshall Space Flight Center. From left, Representative Larry Winn, Jr. (Republican of Kansas), Representative Ronnie G. Flipppo (Democrat of Alabama) and Dr. William R. Lucas of NASA's MSFC. "HEAO" refers to High Energy Astronomy Observatory.

RELATIONS WITH APPROPRIATIONS COMMITTEE

Fuqua developed the feeling over the years that all too frequently the Science Committee would "pass legislation and then let it proceed on its own merits." He added:

With the Appropriations Committee, we are now actively working with Eddie Boland (chairman of the House Appropriations Subcommittee which handles NASA, NSF and many programs in the Science Committee's jurisdiction) to try and be sure the programs are not eliminated—that they understand what we are trying to do. We've had, I think, reasonably good cooperation.

Within the committee, Fuqua says:

I think one of the differences between myself and Teague is that I have given subcommittee chairmen more autonomy than they have had before, without turning the committee over to them.

This policy has relieved a lot of the personal antagonisms formerly developed when subcommittee chairmen frequently had to fight for months, sometimes unsuccessfully, to obtain the kind of staff assistance they deemed essential to get their jobs done. Under Fuqua, new staff assistants have been brought aboard expeditiously, without the somewhat artificial challenging of "qualifications" which in times past had been frequently used to cover up a desire by either a chairman or committee staff director to centralize power.

Of all the four chairmen, Fuqua's relations with the minority was perhaps the closest. To be sure, there was an initial brush with ranking minority member Wydler, when the latter charged he had not been sufficiently consulted on the committee budget to be presented to the House Administration Committee early in 1979. But gone were the days when the chairman and ranking minority member engaged in shouting matches over diametrically opposing views on staffing. No longer did the corridors of the committee reverberate with the colorful epithets which Teague and Wydler used to exchange on minority staffing. Although Wydler remained studiously independent in his beliefs and substantive views, a very close personal working relationship developed between Fuqua and Winn—the second ranking Republican on the committee.

RELATIONS WITH EXECUTIVE AGENCIES

Fuqua's relations with the agencies and their administrators also differed from the mode of operation of his predecessors. Brooks in his short tenure was noted for always trying to push, push, push for faster action, and keeping the agency heads at arm's length. Miller developed social friendships with, and frequently became almost an apologist for the agencies and their top personnel. Teague was a restless traveller who sponged up information on frequent field trips, asked hard-nosed questions where necessary, told agency heads bluntly when he thought they were wrong, and was an indispensable ally when it came to working toward mutual goals. Fuqua is determined to work more closely with high officials like Dr. Frank Press, head of the Office of Science and Technology Policy in the White House. At the same time, he will not relax his constitutional responsibility to exercise vigorous oversight when necessary. To illustrate this point, when NASA revealed to the committee surprising cost over-runs in Fuqua's No. 1 favorite program, the Space Shuttle, Fuqua addressed these crisp words to NASA Administrator Dr. Robert A. Frosch on June 28, 1979:

The timing of this subsequent budget amendment raises questions with regard to the accuracy and candor of testimony and response to questions at the February hearings. It is most difficult to understand how a problem of this magnitude developed between March and May.

One could hardly imagine Chairman Miller addressing that kind of a critical statement to any NASA official.

A NEW EXECUTIVE DIRECTOR

Col. Harold A. Gould was a natural to move up to become executive director of the committee when Fuqua ascended to the chairman-

ship at the beginning of 1979. In the early 1960's he had served two uniformed tours of duty with the committee on assignment from the Army Corps of Engineers (see pages 118–121), specializing in construction and budgeting matters. He moved up slowly but steadily in the committee hierarchy.

When Teague became chairman, in 1973, he wanted an astronaut as his executive director. But former astronaut Swigert, recognizing Colonel Gould's administrative ability, persuaded Teague to name him as his deputy director in mid-1975. Then when Swigert went off to make his unsuccessful race for the U.S. Senate in Colorado, Mosher became the third executive director in September 1977, with Colonel Gould remaining as deputy director. Teague's decision in 1977 indicated a faith in Colonel Gould's competence in administration, but also a desire to extend the concept that the top post required someone with closer ties with the scientific community.

MUTUAL TRUST

Colonel Gould started his first tour of duty with the committee the same year that Fuqua began his service in Congress and on the committee—in 1963. Because Fuqua's central interest and specialty on the committee had been NASA, over a period of 16 years he had developed a good working relationship with Colonel Gould. Both men could anticipate how they each reacted. It was not unexpected when Fuqua tapped Colonel Gould to move up to become the committee's fourth executive director early in 1979.

At the age of 61, an avid golfer, Colonel Gould believes in keeping the troops happy by having all channels open and insuring that harmony reigns within the chain of command. His transition from deputy director to his new post was easy and painless; he did not even change offices. Colonel Gould announced at a staff meeting that one of his first decisions was to abolish his own former job of deputy director.

GENERAL COUNSEL

After having served on the staff of the select committee which preceded the Science Committee, and also for many years as staff director of the Science, Research and Technology Subcommittee, Philip B. Yeager (see page 133) was promoted in 1979 to the post of general counsel of the full committee. Unlike the connotation of the title, the new office did not make Yeager the chief "legal officer" of the committee. Rather, his responsibilities included principal authority for following and perfecting legislation as it moved through the committee, and its relationship with executive agencies—especially the

Office of Science and Technology Policy and OMB— the Senate and public input. He was given broad supervision over the committee rules, jurisdictional relationships within the committee and with other House committees, and general inquiries which involved committee policy. He also coordinated relationships with the legislative service organizations—GAO, OTA, CBO and CRS.

When Yeager became general counsel in 1979, his new job was defined in much different form than the old position of deputy director which Colonel Gould had held from 1975 to 1979. The general counsel performed advisory rather than administrative duties, and by personal preference Yeager stayed clear of such issues as personnel and staff relationships. He was well-equipped to undertake new initiatives in the area of "foresight" for the committee, a function which had been somewhat overshadowed by the emphasis on "oversight." For example, in the summer of 1979, Yeager undertook a study of those subjects of emerging importance on which the committee might concentrate its efforts in the nonenergy field.

SUMMARY OF CHAPTERS

From the days in 1958 when the Select Committee on Astronautics and Space Exploration created the Committee on Science and Astronautics and also the National Aeronautics and Space Administration, the character and influence of the Science Committee have changed markedly. Starting out as a committee which was set up to respond to the launching of the Soviet Sputnik, at the beginning it was looked upon by some as a repository of far out concepts. The committee quickly established a reputation for breadth of vision and responsibility by moving into areas such as the relation of space to military weapons development, and the need to invest in advanced research and the education and training of scientific and engineering talent to enhance the future strength of the Nation.

Chapter I

In the first year of its existence, the committee in 1959 began to forge links with the scientific community through the Panel on Science and Technology. These were later materially strengthened under the Subcommittee on Science, Research and Development chaired by Congressman Daddario. For the first time in history, Congress afforded to science and technology an open door for consultation and mutual interchange of ideas. Despite the headline-hunting pressures of the space race with the Soviet Union, this relationship stimulated the consideration of future issues and mature advanced planning beyond the next budget.

Chapter II

When House Armed Services Committee Chairman Carl Vinson succeeded in spiriting out the second-ranked member of his committee, Overton Brooks, by maneuvering to have him named Chairman of the Science and Astronautics Committee, there were those who concluded that this doomed the new committee because of poor leadership. To be sure, Chairman Brooks made mistakes— he operated all over the lot, his adrenalin was too strong for his small and overworked staff, and he angered the subcommittee chairmen by centralizing power without delegation. Yet he firmly and fearlessly pressed forward to instill a sense of urgency into the space program, while encouraging broader relationships throughout the scientific arena. In getting the committee off to a fast start, Brooks was aided considerably by the presence of Majority Leader—and later Speaker—John W. McCormack, who had chaired the select committee in 1958. Former Speaker and Minority Leader Joseph W. Martin Jr. also helped smooth Republican support for the committee's efforts. Later, Carl Albert's service on the committee helped weld stronger leadership support as Albert advanced through the ranks to become Speaker of the House.

Once the committee had firmly established its authority to conduct annual authorizations for NASA, the next step was to insure that the intent of the Congress was carried out in the policies and programs of this rapidly expanding agency. In a larger sense, the committee repeatedly prodded NASA into speedier action on propulsion, training, spacecraft development, and the timetable on a manned lunar landing. At the same time, the committee pushed for a speedup in programs for communications, weather and navigations satellites. In addition to its role as an accelerator, the committee actively worked to protect NASA from the intrusions of the military attempting to invade NASA's jurisdiction. This included committee initiative to expand the Cape Canaveral launch area for NASA's future operations.

Chapter III

When George P. Miller became chairman after Brooks' death in 1961, the subcommittees were delegated expanded authority, and morale generally rose among the staff. But the size of the staff never exceeded a dozen professionals during the Miller regime and this handicapped the scope of investigations and oversight. Despite the agitation of the minority for staff representation, not until 1968 was the minority allowed to have one staff member and it was 1971 before the minority had its own unit including more than one staffer.

Chapter IV

Avuncular and at times irascible, Chairman Miller developed a closer rapport with the scientific community, the National Science Foundation, and the National Bureau of Standards. The committee took the initiative to cut down the size and eventually terminate the super booster, Nova, which had originally been designed to make direct manned ascent to the Moon. The committee recognized that Nova was no longer needed when the lunar orbit rendezvous was picked as the technique of manned lunar landing.

Chapter V

While Miller was building international relationships in the scientific field, Teague and his Manned Space Flight Subcommittee were crisscrossing the country, dropping in on aerospace contractors, NASA installations, and laboratories to check on contracts, expenditures, and timetables. With the full support and encouragement of the committee, Colonel Gould was on the road frequently to spur NASA to adopt stricter design criteria and construction standards. Meanwhile Daddario, along with his key staff man Yeager, was broadening the legislative use of scientific talent and advice through several formalized panels, the encouragement of the Science Policy Research Division of the Library of Congress, and generally throwing out the congressional welcome mat to science and technology throughout the world. The committee rendered powerful support for the expansion of education in both the natural and social sciences, primarily through the National Science Foundation. Dr. Philip Handler, President of the National Academy of Sciences, put it this way, in a letter to Teague on July 13, 1978:

Not only did the creation of your committee provide a formal institutional arrangement for legislative promotion and oversight of science and technology, it also gave to the Nation's scientific and technological community a valuable forum at our national seat of government for interaction with the political process.

Chapter VI

In addition to his concentration on oversight of the NASA program, Teague placed heavy stress on educating the Congress and the public on the practical values of space. He encouraged a steady stream of congressional visitors to Cape Canaveral for manned space launches, pioneered the establishment of a visitor's center at the Cape, stressed the development of a more practical public affairs program for NASA, and repeatedly needled NASA to give more attention to the spinoffs or industrial and human applications of the space program. Fuqua and Frey also reiterated this point, especially as NASA's budget declined.

During the 1960's, although Chairman Miller remained an almost uncritical supporter of NASA, numerous committee members spoke their own minds and engaged in open internecine warfare on various issues. At the start of the space program, there were deep splits within the committee over such issues as solid versus liquid propellants, how much emphasis should be placed on the development of nuclear rockets—the Nerva program—and whether or not to build an Electronics Research Center. The propellant battle was won by the liquid advocates, the Nerva fight roared on into the early 1970's and only ended when its No. 1 tub thumper—Senator Anderson—left the Senate in 1972, and the opposition forces finally won their point in the closing of the Electronics Research Center after President Nixon took office. Karth, Wylder and a determined group of Republicans fought the building of ERC in Cambridge, Mass., lost the early battles to superior forces, but won the war when ERC was shut down and turned over to the Department of Transportation in 1970.

The committee basked in the glory of the string of successful Mercury and Gemini flights of the early and midsixties. When tragedy struck on the launching pad as astronauts Grissom, White, and Chaffee were killed in the 1967 fire, Teague helped rescue the program through the thorough, fair, and constructively searching investigation he chaired on the causes of the fire and steps which had to be taken to protect the future safety of the astronauts. Astronaut Frank Borman, a member of NASA's review board on the Apollo fire, reflected in 1978 on the committee probe:

The investigation was tough, impartial, and a positive factor in the ultimate success of the Apollo program.

Chapter VII

In the early 1960's, Karth and his subcommittee set a high standard for hardnosed oversight investigations of the management, scheduling and performance of such programs as the Centaur launch vehicle, Ranger and Surveyor lunar probes, and Advent military communications satellite. He also furnished leadership for NASA's planetary programs, and applications such as Earth resources satellites. Hechler's subcommittee helped focus NASA's attention on aeronautics, the need to build a reservoir of basic and advanced scientific research, and the necessity for training a younger crop of future scientific talent. As the 1960's progressed, Pelly, Wylder, and Goldwater pitched in to stress aeronautical research and development, and bring more sense and coordination into the multiagency programs in this field where the United States had once maintained world superiority. Hechler,

and later Karth, also concentrated their subcommittees on the speedier development of weather, communications, navigation, and geodetic satellites and radio astronomy.

Chapter VIII

Future planning was a recurrent theme which the committee pushed in every area of its activity. The committee pressure for post-Apollo space planning began several years before the first Moon flight. A deep bipartisan split developed in 1970, the first year NASA sought funds for the Space Shuttle. The efforts of Karth and Mosher to slash funding for the Shuttle lost only by a tie vote that year, although both Members later swung around to support this new space transportation system. Throughout the 1970's, the committee took a particular interest in the expansion of Earth resources and educational satellites, and Fuqua exerted leadership in the areas of space industrialization, the future development of solar power from satellites, and the establishment of an operational Earth Resources Information System.

When Teague assumed the chairmanship in 1973, the committee took a new lease on life. As chairman of the Democratic Caucus and longtime Veterans' Affairs Committee chairman, Teague had built a unique reputation in the House which was well-described by John Walsh in the *Science* magazine of January 12, 1979:

The House has its own hierarchy of values, and Teague's perceived virtues were cardinal ones—personal integrity, concern for the House as an institution, and fairness in exercising power. There was also respect for his toughness: the nickname "Tiger" has stuck with him since high school and gives some inkling of one dimension of his personality. And there was the direct, unassuming manner and the invisible ribbons on his chest.

Chapter IX

Steady progress was made in the development of the Space Shuttle to carry numerous payloads into space with a recoverable booster. In 1973, three groups of astronauts had successfully completed flights of 28, 59, and 84 days during which they performed valuable experiments on Earth resources, astronomy, in medical, environmental and other areas while visiting the orbiting laboratory named Skylab. But by 1979, unforeseen cost and scheduling problems surfaced with the Shuttle, delaying its first launch. The effect of sun spots caused Skylab to fall into the Earth's gravity sooner than expected, on July 11, 1979. The pieces of Skylab fell harmlessly to Earth, primarily in isolated areas of Australia.

The committee continued to encourage NASA applications, spin-offs, and technology utilization, and always funded more in these areas than NASA requested. In addition to the direct benefits through

the use of weather, communications, and Earth resources satellites, the spinoffs included such items as the following:

- Solar cells to convert sunlight into electrical energy.
- Rechargeable electric pacemaker for heart patients.
- Voice-activated wheelchair for paralyzed patients.
- Domed fabric roofs, originally developed from fiber glass fabric used for astronauts' space suits.
- Satellite video transmission for medical and educational use.
- "Image enhancement" through computers to enhance photographs and old documents.
- "Intruder detectors" for use in homes and industrial plants, developed from highly sensitive seismic monitors used on the Moon.
- Microminiaturized transistors and electronic equipment.

Chapter X

Working through the United Nations and other international organizations, the committee gave strong support to the international aspects of science and space. This extended from encouraging agreements with other nations on satellite launchings, to the establishment of the worldwide tracking network, and exchange of scientific information with many nations to the 1967 Treaty on the Peaceful Uses of Outer Space. The committee sponsored the codification and publication of international space treaties and space law. In 1971, the committee formalized some of these activities through the establishment of the Subcommittee on International Cooperation in Science and Space, which lasted in one form or another until 1979, when its activities were re-incorporated primarily into the Science, Research and Technology Subcommittee. Chairman Miller and other committee members made countless journeys to speak at international scientific meetings and lend support to the scientific endeavors of other nations and groups of nations.

Teague, who vehemently opposed President Kennedy's 1963 advocacy of a joint Soviet-U.S. manned flight to the Moon, also had initial doubts about the rendezvous and docking of American and Russian spacecraft known as Apollo-Soyuz. He insisted that a sufficient number of experiments be placed on the Apollo flight to justify it in case the Soviets should back out at the last minute. The Apollo-Soyuz link up in 1975 proved to be successful in every respect.

In the late 1970's, the committee extended its interest in international areas, including oversight of the Law of the Sea Conference, comparative criminal justice, joint work with the House International Relations Committee on applying science and technology to foreign policy, and oversight on technology transfer to OPEC countries. Through many trips to other countries and attendance at international meetings, the committee members devoted an increasing amount of effort to fostering international scientific cooperation.

Fuqua exerted strong leadership toward the establishment of the Institute for Scientific and Technological Cooperation in 1979. The committee joined in the preliminary planning for the U.N. Conference on Science and Technology, which Fuqua and six other committee members attended in August 1979.

Chapter XI

From the early years of its establishment in 1959, the committee has consistently nudged the Congress and the Nation toward an eventual, voluntary conversion to the metric system. In 1961, the committee reported legislation to study the feasibility and problems involved in possible conversion to metric. Similar legislation was finally enacted in 1968. The Secretary of Commerce reported in 1971, recommending that the change be made "deliberately and carefully" through a coordinated national program with a specific target date for the U.S. to "become predominantly, though not exclusively, metric." Legislation to implement the report did not obtain the required two-thirds majority in 1974 needed for suspension of the rules, and ran into labor and right wing opposition. But a compromise bill passed in 1975, setting up a Presidentially appointed Metric Board, emphasizing any conversion to the metric system would be strictly voluntary, but would be coordinated through the Board and information distributed for schools and industries. By the time the 1975 law was signed, Trinidad, Tobago, Tonga, and the United States were the only nations in the world which have resisted the worldwide trend to adopt the metric system. Every Science Committee chairman, including Fuqua, has publicly endorsed the concept that the United States should voluntarily move toward eventual adoption of the metric system.

Chapter XII

In its review and authorization of the National Science Foundation, the committee fought to increase funding for basic research, high school summer institutes, and general support for higher education in the sciences. Mosher in particular called attention to developments such as the decline in science education funding from 36 percent to 10 percent between 1970 and 1974. The committee was torn by an emotional fight over the MACOS ("Man, a Course of Study") program which had been funded by NSF for use in anthropology courses for students in the fifth through seventh grades. Conlan charged that films and readings on the habits of the Netsilik Eskimos included "predominant emphasis on sex, pragmatic respect for life, shocking film segments displaying gore and immoral acts." Committee members reviewed the materials and films. Mosher, Symington, and Ottinger argued that the Federal Government should not interpose its judgment against the thousands of school boards throughout the country, which

had the full and free right as elected bodies to accept or reject the materials. Teague, Wydler, and Mrs. Lloyd contended that it was shocking that the Federal Government should spend tax money on materials which were degrading. The House voted down by 218 to 196 Conlan's efforts to require Congressional committee review and approval of all MACOS materials before their release for use locally. A number of review committees were appointed, including a citizens committee which Teague appointed, headed by Dr. James M. Moudy, chancellor of Texas Christian University. The Moudy Report recommended that the MACOS materials be used only with care, with thorough training of the teachers who might use the materials, and also added:

From reports reaching us, we believe that the surest success of MACOS has come in those schools where ample preparations were made, including conferences with parents to show them in advance the MACOS materials, and to explain the purposes and methods of the course.

Starting in 1976, McCormack and Harkin had an annual clash over the "Science for Citizens Programs," inserted into the NSF authorization bill by Senator Kennedy to improve public understanding of science and technology issues. McCormack and many of the committee members looked on the measures as funding environmental extremists and intervenor groups to file delaying lawsuits, while Harkin viewed it as a natural extension of enlightening more people through the exercise of the democratic process. Generally, the result was to fund the program at a compromise level halfway between the House and Senate figures.

Until the end of the decade, the committee continued to stress the need for greater emphasis on science education by NSF, and increased the funding in this category. The perennial flap occurred over the "silly-sounding projects" nearly every time the NSF authorization bill was considered on the House floor. Teague cited the studies of the sex life of the fly which led to the elimination of the dreaded screw-worm which afflicted cattle. Harkin related that NSF grants to research "The Excretion of Urine in the Dog" and "The Excretion of Insulin in the Dogfish" led to the discovery of "vital information on the function of the human kidney and the relationship of hormones to kidney functions."

Among the major pieces of legislation originating in the committee, and passed exclusively through the committee's initiative, was the establishment of the Office of Technology Assessment. The first bill was cosponsored in 1969 by Daddario and Mosher, growing out of a phrase, popularized by Daddario, that Congress needed a "technological early warning system." The legislation set up a Technology

Assessment Board with a staff to make studies and appraisals projecting the impact of technology in various fields. Although the committee-reported legislation, strongly backed by Miller, Mosher, Davis, and Symington, initially included a mixed Board of both congressional, executive agency, and public appointees, a floor amendment by Representative Jack Brooks (Democrat of Texas) made the Board an all-Congress affair of five House and five Senate Members. The President signed the OTA legislation on October 13, 1972. The OTA was only the third independent service organization created for Congress in the Nation's history—the first being the Library of Congress in 1800, and the second the General Accounting Office in 1921.

OTA Board members from the Science Committee included Teague (chairman, 1975–76), Mosher (vice chairman, 1973–74), Winn (vice chairman, 1977–78), Davis, Esch, Brown, and Wydler. The Subcommittee on Science, Research and Technology exercised fairly extensive oversight over OTA, and in 1977 and 1978 held hearings on its operation, noting some of its ongoing problems yet encouraging the continuance of its role in making technological evaluations and assessments for Congress.

Among other legislation enacted on the initiative of the Science, Research and Technology Subcommittee were the following laws:

Fire Research and Safety Act of 1968, adding new responsibilities to the National Bureau of Standards, including special training and demonstration programs in fire prevention, expanded by 1971 act to establish Fire Research and Safety Center. This was further supplemented by the 1974 legislation which set up a National Fire Prevention and Control Administration within the Department of Commerce, and authorized a U.S. Fire Academy. The legislation was further strengthened in 1976, and again in 1978.

Updating and strengthening the Standard Reference Data Legislation, originally passed in 1968, in legislation passed in 1972. This statute helped develop world-wide scientific and engineering standards for such elementary items as how much heat is given off when a substance is burned, how fast methane will react with air, or how soluble mercury is in water.

—Earthquake Hazards Reduction Act of 1977, coordinating Federal research, prediction, and warning systems. Brown was the chief sponsor of this legislation.

Native Latex Commercialization and Economic Development Act of 1978. Popularly known as the "guayule bill," this legislation was also the result of Brown handiwork, authorizing the Agriculture and Commerce Departments, along with the NSF and Bureau of Indian Affairs to carry out research and development of the guayule plant as a possible source of natural rubber for commercial use.

Working with the National Bureau of Standards, the committee assisted in the development of voluntary industrial standards, helped draw up and write into law a new organic act for the National Bureau of Standards, and laid the groundwork for several searching studies of

national materials policy. Led by Thornton, the committee also carried forward extensive oversight and public information hearings, and published useful reports on DNA and genetic engineering—popularly known as “gene-splicing.” In 1977 and 1978, Thornton and Fuqua led hearings on the science policy questions and benefits which might be achieved by DNA research. In addition, inquiries were made in the effective utilization of Federal laboratories, fuller employment of scientists and engineers, the encouragement of science policy developments on the State and local level, river basin planning, water resources, agricultural research, world food problems, and Federal patent policies as they related to scientific and technological matters. In 1979, the House passed a materials policy R. & D. bill.

Chapter XIII

When President Nixon in 1973 abolished the scientific machinery in the White House, the committee started a long campaign to re-establish the presence of scientific advice at the highest levels of government. It was one of the major achievements of the committee, demonstrating congressional initiative at its finest. Under the bipartisan leadership of Teague and Mosher a thorough record was established through exhaustive hearings held in the three-year period from 1973 through 1975. With the assistance of a broad representation of the scientific community, including all of the former Presidential science advisers, the committee carefully proceeded toward drafting acceptable legislation which would give science and technology a strong voice in the White House structure. Watergate and President Nixon's resignation at first seemed to divert attention from the careful work the committee had accomplished, but the net effect was to speed up the timetable considerably. Mosher found Vice President Ford receptive, and both Teague and Mosher realized that once Ford became President he was a key factor in reestablishing the science machinery in the White House. In fact, Mosher wrote President Ford a personal letter the day after he was sworn in, urging him to give additional thought to the issue. There were still long months of negotiation ahead, particularly involving Vice President Rockefeller. The committee kept pressing toward perfecting a Teague-Mosher bill which was acceptable to the White House. Rockefeller provided a dramatic spectacular when he visited and endorsed the efforts of the committee in a public hearing on June 10, 1975.

As the Teague-Mosher bill finally evolved, it set up an Office of Science and Technology Policy with a Director who would also serve as the President's Science Adviser. These features survived in the progress of the legislation. A major breakthrough occurred when

President Ford wrote Teague and Mosher on October 8 endorsing the legislation. The committee reported the bill unanimously, although Brown appended "additional views" to the committee report criticizing the lack of long-range planning language in the legislation. After long and difficult negotiations between the Senate and Science Committee staffs, the conference committee met to work out the final details. President Ford signed the legislation in the East Garden of the White House on May 11, 1976, before about 200 guests. There were some differences which Teague expressed to President Carter's Director of the Office of Science and Technology Policy over interpretation of the 1976 act. But when Fuqua became chairman he took the position that the new President and OSTP Director were entitled to devise the kind of operation they found most comfortable—so long as they did not, like President Nixon had, dismantle the machinery or violate its central goals.

Chapter XIV

Starting in 1971, the focus of the committee began to broaden with the establishment of the task force and later the Subcommittee on Energy under McCormack's leadership. Three landmark pieces of legislation were developed by the Energy Subcommittee and enacted in 1974: the Solar Heating and Cooling Act of 1974; the Solar Energy Research, Development, and Demonstration Act of 1974; and the Geothermal Energy Research, Development, and Demonstration Act of 1974. McCormack's influence added another dimension to the committee's jurisdiction as he coined the concept of "demonstration" to stretch the committee's activity beyond R. & D.

The task force and Subcommittee on Energy firmly established the reputation of the Science Committee in the energy field, and its expertise was recognized both in and out of the Congress. The successful work accomplished under McCormack's leadership had a direct relationship to the expansion of the committee's jurisdiction in the energy area in 1974.

Chapter XV

The year 1974 was a watershed year for the Science Committee. For it was during that year that the Select Committee on Committees, headed by Representative Richard Bolling (Democrat of Missouri) recommended vastly expanded authority and responsibility for the Science Committee—principally through legislative jurisdiction over all energy research and development, plus oversight authority over all Federal R. & D. and broadened jurisdiction over civil aviation and environmental R. & D. There were also other refinements, such as abolition of the Joint Committee on Atomic Energy and transfer of its

jurisdiction over nonmilitary nuclear R. & D. to the Science Committee, which did not go through until 1977. The Democratic caucus scuttled the Bolling recommendations and referred the entire package to a caucus committee headed by Representative Julia B. Hansen (Democrat of Washington). The Hansen committee, with the significant exception of the nuclear R. & D. jurisdiction, was equally generous to the Science Committee. It took months of careful staff work, numerous drafts of testimony and help solicited from outside witnesses who testified. These efforts were supplemented by many strategy sessions within the staff and committee. The presence of two friendly staff members on the Bolling committee—Dr. Charles S. Sheldon II and Robert C. Ketcham—certainly helped. But above all, Teague's tremendous prestige in the House, his position as chairman of the Democratic caucus, and his personal phone calls and conferences with Bolling, Mrs. Hansen, and other Members were worth their weight in gold.

When the Bolling committee's recommendation to abolish the Merchant Marine and Fisheries Committee went down the tube, it looked as though the Science Committee would lose its chance to obtain jurisdiction over oceanic and atmospheric sciences. But a clarifying colloquy between Hechler and Mrs. Hansen established the intent of the Hansen committee that this jurisdiction be shared. This gave the Science Committee the green light to proceed in that area, in collaboration with the Merchant Marine Committee.

In December 1974, Teague took the senior committee Democrats out for a boat ride one evening on the Potomac River. After drinks and dinner, Teague asked each member to express his preference on the jurisdiction of subcommittees. McCormack argued it made sense to centralize authority over energy R. & D. in one subcommittee, and Hechler argued for two. After extended discussion, a show of hands indicated, by a narrow margin, that two energy subcommittees were preferred. McCormack subsequently chose to head up a subcommittee which encompassed solar, geothermal, conservation, and advanced energy technologies, while Hechler chose coal, oil, and gas (fossil fuels). In 1977, Flowers exercised his seniority to choose fossil and nuclear R. & D. (By 1977, with the abolition of the Joint Committee on Atomic Energy, nuclear jurisdiction passed to the Science Committee.) McCormack then chose advanced energy technologies—about the same jurisdiction he had had the two prior years. In 1979, the energy subcommittees were rescrambled, with McCormack getting nuclear and geothermal, while Ottinger was given fossil, solar, and conservation.

The minority, after many years of agitation, finally got their first staff member, Richard E. Beeman in 1968. Not until 1971 did they have a "minority unit" including more than one designated staff member. By 1973, when Teague became chairman, the Republicans had only two professionals and one secretary to call their own.

Teague strongly resisted the concept of a minority staff. He frequently called attention to the fact that his executive director, Jack Swigert, had confessed to being a Republican, and Teague had warned Swigert he would fire him if he ever repeated that fact—because Teague stressed the staff should be nonpartisan and serve all members, Republicans and Democrats alike. The Republicans would not accept that argument, and continued to claw away, bolstered by strong encouragement from Republicans everywhere. The new rules of the House adopted in January 1975, authorized the ranking minority member of up to six subcommittees "to appoint one staff person who shall serve at the pleasure of the ranking minority party member." The House rules also authorized a total of six professional and four clerical personnel, as statutory members of the standing committee staff, to be assigned to the minority when requested by a majority of the minority members. The minority on the committee lost no time in attempting to implement these new rules and managed eventually to do so after some heated arguments over "qualifications." Paul Vander Myde became the first officially designated minority staff director in 1977.

In 1976, Teague established the Ad Hoc Subcommittee on Special Studies, Investigations and Oversight and hired Dr. Robert B. Dillaway as its staff director. Only one study was published, a report on EPA's Community Health and Environmental Surveillance System (CHESS). A large amount of the work on this study was actually done by the Brown Subcommittee on the Environment and the Atmosphere, with assistance from the Congressional Research Service of the Library of Congress. The reaction to Dr. Dillaway's work was mixed, there was a great deal of argument concerning the overlap of his work with the existing subcommittees, and he left the committee staff in 1977. Several unpublished studies on NASA's aeronautical R. & T. and NASA's energy R. & D. proved useful.

Teague also took the initiative to have the committee conduct research and help coordinate programs to aid the handicapped. Early in 1976, Sherman Roodzant was placed in charge of this special oversight program. Roodzant was assisted by John G. Clements, who succeeded him in 1979. A panel of experts studied the problems of the handicapped in 1977, followed by hearings chaired by Brown and

conducted under the aegis of the Subcommittee on Science, Research and Technology. A second panel reported in 1978, and some of its recommendations were incorporated in legislation which the Congress passed in 1978, establishing a National Council on the Handicapped and a vastly increased research program for the handicapped, placed within the HEW Department.

Despite the failure of the Dillaway oversight operation in the 94th Congress, in 1979 the committee Democratic caucus voted to set up a new Subcommittee on Investigations and Oversight. Representative Jim Lloyd (Democrat of California) was elected chairman. In conjunction with the Science, Research and Technology Subcommittee, an investigative trip to Mexico examined the potential for the transfer of technology and energy resources between the United States and Mexico. The Lloyd subcommittee also held hearings on the aeronautical design of the DC-10, and those technical aspects which might require future modifications, in light of the worst tragedy in U.S. aviation history on May 25, 1979.

On July 19-20, the committee held two successful joint hearings with the Select Committee on Aging on applications of space technology for the elderly and handicapped.

Chapter XVI

Continuing the work which he had started in 1963 as chairman of the Subcommittee on Advanced Research and Technology, Hechler put increasing emphasis on basic research and an expansion of R. & D. work in aeronautics. With the strong support of Pelly, Wydler, and Goldwater, and the interested participation of Davis and Symington, Hechler's subcommittee succeeded in concentrating more of NASA's attention on safety, general aviation, and airport and airways congestion, short takeoff and landing planes, as well as the training of young aeronautical engineers. For several years, Hechler pressed for the upgrading of aeronautics in the NASA hierarchy, and also agitated for an Associate Administrator for Aeronautics and a separate office to handle General Aviation. In 1972, the name of NASA's Advanced Research and Technology Office was changed to the "Office of Aeronautics and Space Technology," opening the way for the Hechler subcommittee to change its name to the "Subcommittee on Aeronautics and Space Technology." Roy P. Jackson was then named NASA's Associate Administrator for Aeronautics and Space Technology. In 1973, NASA, following the insistence of the Hechler subcommittee, set up a separate General Aviation Technology Office.

Overflow crowds and high public interest attended the Hechler subcommittee hearings in 1972 reviewing the joint NASA-DOD study of "Civil Aviation Research and Development." The hearings and oversight which the subcommittee held in 1972 and 1973 laid the basis for later proposals by both the executive branch and the Congress for reducing aircraft noise levels by significant amounts through retrofitting the existing civil aviation fleet. The subcommittee also achieved improvement in communication and coordination among agencies engaged in the noise problem by summoning witnesses from NASA, FAA, EPA, and DOD around the table at one time.

In 1975, when Milford took over the subcommittee chairmanship, the jurisdiction was expanded to include all civil aviation R. & D. (part of which had been lodged in the Interstate and Foreign Commerce Committee) and ground transportation R. & D. Although the Milford subcommittee annually authorized FAA R. & D., the Senate would not go along with this initiative. The subcommittee became embroiled in an internal controversy over the validity of an FAA decision to adopt a microwave landing system which differed from the British "doppler system" and involved ultimately a decision by the International Civil Aviation Organization. The Milford subcommittee held constructive hearings on the future of aviation, the future needs and opportunities of the air traffic control system, and supersonic technology. In the fall of 1978, the subcommittee recommended legislation to provide a basic charter for the National Weather Service, pulling together bits and pieces of prior legislation going back over 100 years and consolidating the duties which had been previously authorized. The 1978 legislation passed the House but not the Senate.

Starting in 1974, Brown was joined by Symington and other members who sponsored automotive research legislation to devise more efficient auto engines, including a possible alternative to the internal combustion engine. McCormack took up the fight in 1976, and his subcommittee shepherded through a bill which President Ford vetoed, but was repassed in the next Congress and signed by President Carter in 1978. The legislation provided for a 5-year R. & D. program to develop a new and more efficient automobile engine. When Harkin took over the Transportation, Aviation and Communications Subcommittee in 1979, he put high priority on development of more fuel-efficient propulsion for automobiles and expansion of the use of electric vehicles. The Harkin subcommittee also held hearings on aviation collision avoidance.

Chapter XVII

In 1975, the Hechler subcommittee put increased funding into in situ low Btu coal gasification, coal mining research, health studies

of the high incidence of nonpulmonary diseases among coal miners, and the environmental effects of coal mining. The subcommittee succeeded in line-iteming the numerous features of the fossil fuels R. & D. authorization, including funding for five coal liquefaction plants, a clean boiler fuel demonstration plant, and additional R. & D. in four different methods of converting coal to liquids for energy. The subcommittee also supported expansion of research in magnetohydrodynamics, oil shale, coal combustion, methods of recovery of oil and gas, methanol, gasohol, and fluidized-bed technology for coal.

A Senate plan for loan guarantees for synthetic fuels was embraced by the Ford administration, but later defeated in the House in both 1975 and 1976. Hechler contended that insufficient attention had been focused on the community impacts of the plan, and Ottinger led the opposition in 1976 on environmental grounds and the subsidies to large energy companies. Hechler suggested that the proper approach would be either to expand the existing Federal expenditures to bring the synthetic fuels plants to commercialization, or else to exercise a firmer control in the public interest such as in the World War II synthetic rubber program. The issue split the committee, and Teague, McCormack, Fuqua, and a majority of the committee favored the synthetic fuels loan guarantee proposals. The advocates contended that the opportunity should be seized when it presented itself, since time was of the essence in the energy crisis.

The supporters also stressed that any environmental, community impact or other problems could be identified and then corrected as a consequence of the demonstration process. Supported by the administration and encouraged by a topheavy 80-10 majority in the Senate, those advocating loan guarantees and other supports for synthetic fuels also received widespread industrial support and in articles and editorials. Strategically, however, a critical editorial in the *Wall Street Journal* proved very influential in mobilizing conservative support against loan guarantees. On December 11, 1975, the issues were debated in the House, which soundly defeated the loan guarantee provision by 243-140, and went on to vote down the leasing of public lands for oil shale demonstration, 283-117.

The following year the advocates of loan guarantees, price supports and construction grants for synthetic fuels regrouped their forces and extensive hearings were held in both the House and Senate. On September 23, 1976, the House, after one hour of debate on the resolution from the Committee on Rules to bring up the synthetic fuels bill, defeated the rule by 193-192.

In 1977, Flowers became chairman of a newly constituted subcommittee with jurisdiction over fossil and nuclear R. & D. Among

the issues with which the Flowers subcommittee dealt were the role of the national laboratories in energy R. & D., clean air standards, support for magnetohydrodynamics, and management of the MHD program, and construction oversight on coal liquefaction (at Cresap, W. Va., and Catlettsburg, Ky.)—at both of which remedial management action was recommended and carried out. The Flowers subcommittee also recommended the building of a second solvent refined coal (SRC) liquefaction plant, a recommendation which was also made in 1979 when Ottinger took over the subcommittee. The Ottinger subcommittee generally supported the DOE effort in 1979 to reorganize the coal mining R. & D. program, and reorient it toward meeting productivity and environmental standards. In 1979, the subcommittee added funds for anthracite mining, fuel cells, combustion systems, heat engines and heat recovery.

Chapter XVIII

A no-win controversy developed between the committee and President Carter over building the \$2.6 billion Clinch River Breeder Reactor (CRBR). A majority of the committee strongly favored the CRBR, which had been supported by both Presidents Nixon and Ford but opposed by President Carter. President Carter's early position was that the production of plutonium would lead to nuclear weapons proliferation, a fact disputed by McCormack, who contended that it was cheaper and easier to make weapons outside of the fuel cycle. A small group of antinuclear Democrats, led by Ottinger, contended that the CRBR was outdated. Wydler and Mrs. Lloyd also helped lead the fight to build the CRBR.

Teague led an eight-member delegation to Europe in May and June 1977, where they inspected France's operating breeder reactor, and visited, among other places, the International Atomic Energy Agency in Vienna, Austria.

In 1977, Brown attempted to amend the ERDA authorization bill to reduce the \$150 million of funding for the CRBR to the level recommended by President Carter: \$33 million. Brown's amendment went down by 246 to 162 in the House. Committee Democrats voted 15 to 11 against the amendment and for full funding for the CRBR. Fish and Pursell were the only committee Republicans (out of 13) who supported the Brown amendment.

Although the President vetoed the ERDA authorization bill in 1977, it did not kill the CRBR, because Congress put funds into a supplemental appropriations bill and then arranged for the funding bill to become effective without a specific authorization. Included in the same supplemental bill were many other items the President

wanted, such as the final death blow to the B-1 Bomber, so he was pretty much forced to sign the bill.

In 1978, Teague came up with a compromise negotiated with Secretary Schlesinger, which involved delay in the construction of the CRBR pending a study. McCormack, Mrs. Lloyd, and strong supporters of the CRBR rejected the compromise, which Flowers sponsored. Teague arranged for the President to meet with nuclear industry representatives at the White House, but it failed to shake their position and the Flowers compromise was defeated on June 14, 1978, by a vote of 187 to 142. Once again, in 1979, efforts to resolve the issue failed. The committee stuck to its position in support of the CRBR. The House defeated a Fuqua-Brown compromise effort on July 26, 1979, by a vote of 237-182.

Chapter XIX

In 1975, McCormack became chairman of the Energy Subcommittee which handled solar, geothermal, conservation, and advanced energy technologies. Hechler, Ottinger, Hayes, and Dodd supplemented McCormack's efforts to make increases over the President's budget, and the committee voted boosts of over 100 percent in solar, geothermal, and conservation R. & D. Although the committee increase for solar energy was from \$70.3 million to \$143.5 million, an amendment on the House floor by Representative Frederick W. Richmond (Democrat of New York) added \$50 million on top of that. In a March 20, 1975, letter to Dr. Seamans, McCormack called for more aggressive management than "the low key, academic management style that was characteristic of the NSF."

Brown and McCormack, in 1975, introduced the electric vehicle research, development and demonstration bill to enable 8,000-10,000 electric vehicles to be demonstrated by Government, industry, and individuals throughout the Nation. Teague, Ottinger, Mosher, and Goldwater joined in supporting the bill. President Ford vetoed the bill, but Congress voted to override the veto.

Once again in 1976 and 1977, the committee voted hefty increases for solar, geothermal, and conservation, and on both occasions the House decided to make further increases in solar energy R. & D.

Another committee initiative was the enactment of the Energy Extension Service legislation, the brainchild of Thornton, who patterned the statute after the successful Agricultural Extension Service. The Energy Extension Service helped answer questions and give advice to individuals, businesses, and State and local government officials on energy conservation measures and alternate energy systems. President Carter signed the Thornton bill into law on June 3, 1977.

The committee, led by McCormack and Goldwater, sponsored and piloted through to enactment the Solar Photovoltaic Energy Research, Development, and Demonstration Act of 1978. The bill provided for a 10-year program, doubling the total production of photovoltaic systems each year. In 1978, the committee added \$101.5 million to the President's budget request of \$291.8 million for solar R. & D. operating expenses, and also voted add-ons for geothermal and conservation.

Beginning in 1973, McCormack's Subcommittee on Energy had teamed up with the Space Science and Applications Subcommittee for a joint hearing on the possibilities for solar satellite power. In subsequent years, Fuqua's Space Science and Applications Subcommittee had carried the ball, usually in conjunction with one of the energy subcommittees. A solar satellite power system bill passed the House in 1978, but failed in the Senate, and the committee voted out a new SSPS bill in 1979.

In 1979, Fuqua endorsed the President's goal to generate 20 percent of the Nation's energy by solar means by the year 2000. The committee continued to give strong support to solar and conservation initiatives in 1979. The House passed a wind energy R. & D. bill in December 1979.

Chapter XX

From 1975 through 1978, Brown headed the Subcommittee on Environment and the Atmosphere. One of the first steps the subcommittee took was to help beef up the environment and safety programs of ERDA, after which the subcommittee went to work on their first authorization bill for the Environmental Protection Agency (EPA). The subcommittee adopted an amendment by Hayes requiring a 5-year research plan, which proved to be an excellent management tool. The Brown subcommittee conducted a wide-ranging series of oversight hearings in such areas as depletion of the ozone layer through use of aerosols, sulfates in the atmosphere, waste disposal polluting the oceans, chronic exposure to low-level pollutants, and environmental research centers.

The subcommittee's first enactment was the Resource Recovery Act, which was incorporated into legislation being developed by the House Interstate and Commerce Committee. This legislation included the R. & D. portions developed in the Brown subcommittee relating to the use of waste to generate energy. Next, the subcommittee turned to the National Weather Modification Policy Act of 1976, which authorized the Secretary of Commerce to pull together data on scientific knowledge and technological developments concerning weather modification. President Ford signed the bill into law on October 13, 1976.

In 1977, James W. "Skip" Spensley transferred from the Merchant Marine and Fisheries Committee to become Brown's staff director. A vast amount of the subcommittee's work and achievements were in the environmental and safety features of coal burning and the safety and nuclear waste features of the development of nuclear energy. Among other legislation sponsored by the subcommittee which was enacted into law were the following statutes:

Marine Protection, Research and Sanctuaries Act Reauthorization

This bill, signed in 1977 and developed in conjunction with the Merchant Marine Committee, mandated the end of all ocean dumping of sewage sludge not later than December 31, 1981. A special environmental research program in the oceans was developed as part of the legislation by the Brown Subcommittee.

National Climate Program Act

This legislation, principally sponsored by Brown and signed by the President in 1978, designated the Commerce Department as the lead agency to coordinate Federal plans and research in climate analysis, information and forecasting.

Marine Pollution Environmental Research, Development and Monitoring Act

This legislation, approved by the President in 1978, set priorities for research by the National Oceanic and Atmospheric Administration in areas of ocean pollution.

Antarctic Conservation Act of 1978

This bill, signed by the President in 1978 provided for the conservation and protection of the animals and plants in Antarctica and of the ecosystems on which they depend.

The Brown subcommittee also held a wide number of foresight and oversight hearings and made reports on such issues as ground water quality research, health and safety implications of the President's national energy plan, nuclear waste management, environmental research reserve networks, oil spill recovery technology R. & D., health effects of ionizing radiation, environmental monitoring, and special urban air pollution problems. In conjunction with Representative Paul G. Rogers (Democrat of Florida), a conference was held on August 15, 1978, on the environment and health care costs.

Ambro took over as chairman of the subcommittee at the beginning of 1979, at which time it was renamed the "Subcommittee on Natural Resources and Environment." At that time, the jurisdiction of the subcommittee was expanded to include materials policy, and also all aspects of weather—except aviation-weather services.

* * * * *

On July 20, 1979, appropriate ceremonies were held to commemorate the 10th anniversary of the first small step taken by Neil A. Armstrong when he set foot on the Moon. On the same day, the committee indicated that its sights were focused on the long future rather than the past. In collaboration with its opposite number in

the Senate, the committee had just completed a symposium which, instead of glorifying the past, was devoted to "Next Steps for Mankind- the Future in Space." Preparations were being made to enact legislation for space industrialization and the development of solar power from satellites. The way was being paved for the first Space Shuttle flight. The applications of space technology for the elderly and handicapped were being examined.

A new burst of activity in the two energy subcommittees was concentrated on both old and new sources of energy—solar, geothermal, conservation, biomass, synthetic fuels, and overcoming the problems of low level ionizing and nonionizing radiation and nuclear waste disposal while pointing toward the future uses of nuclear power, including the exciting possibilities of nuclear fusion. The committee was deeply involved in planning for the United Nations Conference on Science and Technology, as well as focusing on legislation to stimulate innovation in science and technology, the role of Federal laboratories in transferring technology to State and local governments, nutrition, decisionmaking in such areas as approving new drugs, and the complex area of risk/benefit analysis and R. & D. policy.

There was no slowdown in the committee's efforts to stress the development of a fuel-efficient and safer automobile, and to push forward the frontiers of research in aeronautics and aviation. The oceans, the climate, the atmosphere, and the total environment occupied the continued attention of the committee as it pointed its sights toward the future.

Even as this is written, the winds of change are still blowing. In the 20 years since 1959, the committee had vastly broadened its horizons. The early concentration on space now constituted only one portion of the committee's mission which in 1979 encompassed energy, transportation, natural resources and the environment, and the use of science and technology toward the solution of present and future problems faced by human beings on Earth. The committee's long string of legislative and other achievements affecting public policy, detailed in these chapters, should not obscure the primary focus on the future of mankind. This was the central concern of the committee as it provided the leadership in humanity's inexorable progress toward the endless frontier.

Photo Credits

The bulk of the illustrations are from NASA, the White House, Department of Energy, Navy Department, National Science Foundation, National Bureau of Standards, and the Democratic and Republican photographers at the U.S. Capitol.

Specific credits are for other photographs which appear on the following pages:

<i>Page</i>	<i>Credit</i>
27	Swann Studio.
61	Department of Archives and Manuscripts, Louisiana State University.
62	McDonnell Aircraft Corp.
343	David C. Greenwald.
363	Del Ankers.
387	Leo Jouan for OECD.
647	Wide World Photos.
854	Battelle-Northwest Photography.
899	Battelle-Northwest Photography.
902	PNL Photography.
933	Sandia Lab News.

Publishers' Credits

The White House Years: Waging Peace 1956-1961 by Dwight D. Eisenhower. Copyright 1965 by Dwight D. Eisenhower, Reprinted by permission of Doubleday & Co., Inc.

Sputnik, Scientists, and Eisenhower by James R. Killian, Jr. Copyright 1977 by The Massachusetts Institute of Technology. Reprinted by permission of The MIT Press.

The Stately Game by James Symington. Copyright 1971 by James Symington. Reprinted by permission of Macmillan Publishing Co., Inc.

We Propose: A Modern Congress, edited by Mary McInnis. Copyright 1966 by McGraw-Hill, Inc. Reprinted by permission of McGraw-Hill Book Co.

Firsthand Report by Sherman Adams. Copyright 1961 by Sherman Adams. Reprinted by permission of Harper & Row.

Appendix

Committee Chairmen

<i>Name</i>	<i>Official dates of service</i>
Overton Brooks	Jan. 7, 1959-Sept. 16, 1961
George P. Miller	Sept. 21, 1961-Jan. 3, 1973
Olin E. Teague	Jan. 24, 1973-Jan. 3, 1979
Don Fuqua	Jan. 24, 1979-

Ranking Republican Members

<i>Name</i>	<i>Official dates of service</i>
Joseph W. Martin, Jr.	Jan. 7, 1959-Jan. 3, 1967.
James G. Fulton	Jan. 26, 1967-Oct. 6, 1971
Charles A. Mosher	Oct. 26, 1971-Jan. 3, 1977.
John W. Wydler	Jan. 19, 1977-

Longevity Record of Committee Members Serving Over 10 Years (As of End of 1979)

<i>Name</i>	<i>Years served</i>
Olin E. Teague	20
Ken Hechler	18
Don Fuqua	17
John W. Wydler	17
Charles A. Mosher	16
Alphonzo Bell	16
Thomas N. Downing	15
George P. Miller	14
John W. Davis	14
George E. Brown, Jr.	13
Joseph E. Karth	13
James G. Fulton	13
Larry Winn, Jr.	13
Thomas M. Pelly	12
Emilio Q. Daddario	12
Barry M. Goldwater, Jr.	11
Louis Frey, Jr.	10
Richard L. Roudebush	10
I. Edward Roush	10

Source Notes

Key to quotations and citations

- CF Correspondence or memoranda in committee files
 CR Congressional Record
 Hg Published committee hearing
 Int Interview (copy in committee historical files)
 Rpt Published committee report
 U—Unpublished committee transcript in committee files

Quotation or citation

- Page*
- 1 Rayburn, McCormack, Maurer, CR, 3-5-58
 - 2 Select committee charter, CR, 3-5-58
 - 3 Ducander, Int.
 - 6 Natcher quote, Natcher Diary
 - 7 Fulton, Hg, 4-15-58
 - 8 Brooks, CR, 3-5-58
 - 9 Ford, Int, McCormack, CF
 - 10 Brooks and McCormack, U
 - 11 Dryden, Hg, 4-16-59, 4-22-59; McCormack, Brooks and Fulton, *Ibid.*
 - 13 Boushey, Hg, 4-23-58
 - 13 Natcher quote, Int
 - 14 Senate committee jurisdiction, CR, 7-24-58; House committee jurisdiction, CR 7-21-58; McCormack and Albert quotes, Int
 - 15 Rayburn and Albert quotes, Int
 - 16 Quotation from committee report, Rpt, 5-24-58; McCormack quote, CR, 6-2-58
 - 17 Johnson quote, CR, 6-16-58; Yeager quote, Int
 - 18 O'Neill Report on H. Res. 580, Rpt, 5-29-58; Bolling quote, CR, 7-21-58
 - 19 McCormack and Martin quotes, CR, 7-21-58
 - 20 Feldman, Int
 - 21 Arends quote, CR, 6-2-58; quote from H. Rept. 1770, Rpt, 5-24-58
 - 22 Feldman and Senator Johnson quotes from Feldman Int
 - 23 McCormack quotes, CR, 7-16-58
 - 24 Ford, Keating and McDonough quotes, CR, 8-20-58; Ford quote, Ford Int
 - 25 Sisk, Ford, Judd, Thomas quotes, CR, 8-20-58, Sheldon, Int
 - 26 Ford, Keating, Cannon quotes, CR, 8-21-58
 - 31 Ducander, Int
 - 32 Brooks quote, CF; Teague quote, Int
 - 33 Letters from Feldman and select committee staff to McCormack and all members of select committee, 7-21-58, CF
 - 33-4 Feldman, Int
 - 34 Ducander, Int
 - 35-7 Quotation from Aviation Week and Space Technology, 2-1-60, Brooks response to Hotz, *Ibid.*, 2-22-60
 - 38 Brooks comments, U, 1-20-59
 - 39 Ducander, Int; Brooks, press release, 1-31-59; *Ibid.*, Hg, 2-2-59
 - 40 Brooks and Fulton, Hg, 2-2-59
 - 41 Quotations from "The Next Ten Years in Space, 1959-1969", Rpt
 - 42-3 Brooks letter to Vinson, 5-9-59, CF, Vinson's response, 5-11-59, CF; Further Brooks-Vinson correspondence, CF
 - 44 Fulton quote, Hg, 2-27-59
 - 45 Brooks quote, Hg, 8-25-59, Brooks letter to Miller, 9-1-59, CF; Ducander memorandum, 4-18-60, CF

Quotation or citation

Page

- 46 Brooks, memoranda to all committee members, 1 26-59, CF
- 47 Teague quote, Hg, 4 24 59; Dryden quote, *Ibid.*
- 48 Teague quote, Hg, 2 18 60; Brooks letter to all committee members, 12-15-59, CF
- 49 Brooks and Teague quotes, 5 6 59, U
- 50 Ford and Thomas quotes, CR, 5-19-59
- 51 Brooks letters to Drs. Glennan, Astin and Waterman, 9 25 59, and to Panel members, 12-15 59, CF; Discussion of Panel at committee executive session, 1-12-60, U
- 52 Brooks quote, Hg, 3-25-60
- 53 Van Allen quote, *Ibid.*, Brooks quote, Hg, 6-2-60; Russell quote, Hg, 6-20-60
- 60 Holmes Alexander Award, text, CF
- 61 Ducander, Int
- 63 Quotation from "Space, Missiles, and the Nation," H. Rept. 2092, 7-9-60; Grissom quote, Hg, 5 28 59
- 64 Horner quote, Hg, 1-28 60; Killian quote in *Sputnik, Scientists and Eisenhower*, p. 140
- 65 Brooks quote, Hg, 1 20 60; Allen and Merchant quotes, Hg, 1 22 60, 1 20 60; Teague quote, address in Dallas, Tex., 4-13 60, CF; Daddario quote, address in Baltimore, Md., 3-17-60, CF
- 66 Glennan quote, Hg, 1-29-60
- 66 7 Teague, Fulton, Sisk, Miller quotes, 1-12 60, U, quote from GAO Report, Hg, 1-27-60
- 67 Brooks quote, 1-29-60
- 68 Von Braun quote, Hg, 4-15-58; Killian quote, *op. cit.*, p. 127
- 71 Siepert quote, Hg, 2-3-60; Sisk, Stratton and Riehlman quotes, CR, 2-8 60
- 72 Glennan recollections, Int
- 73 McDonough and Astronaut Glenn quotes, Hg, 5-28-59; Project Mercury report, Rpt, 1-27-60
- 75 Webb quotes, Int
- 76 Webb and Martin quotes, Hg, 2-27-61
- 77-8 Brooks letter to President Kennedy, 3-9-61, CF; President Kennedy's response, 3-23-61, CF
- 79 Dryden and Seamans quotes, Hg, 3-14-61; Webb appearance, Hg, 4-10-61; Miller and Low quotes, Hg, 4-11 61
- 80 Brooks quote, Hg, 4-11-61; Fulton and Welsh quotes, Hg, 4-12-61
- 81 Fulton, Brooks and Miller quotes, Hg, 4-12-61
- 82 Anfuso quote, Hg, 4-12-61
- 83 Seamans, Int; Brooks quote, Hg, 4-13-61; Webb quotes in memorandum to O'Donnell, copy in NASA Historical Files
- 84 Karth and Weis quotes, Hg, 4-13-61; Low, Int; Seamans, Hg, 4-14-61
- 85-6 King and Chenoweth quotes, CR, 4-14-61; Seamans quotes, *Ibid.*; Washington Post and The New York Times, 4-15-61
- 87 Seamans, Int
- 88 Brooks to President Kennedy, 5-4-61, CF; Brooks and Mosher quotes, 5-4-61, U
- 89 Moeller, Brooks and Teague quotes, 5-4-61, U
- 90 Washington Evening Star, 5 6-61
- 91 Brooks and McCormack quotes, CR, 5-24-61
- 92 Chenoweth and Dryden quotes, Hg, 7-11-61
- 92-3 Miller quotes, 5-24-61
- 96-7 Quotations from James R. Kerr, "Congressmen as Overseers: Surveillance of the Space Program," Stanford University Ph.D. dissertation, 1963
- 97 Miller and Teague quotes, 5-2-62, U
- 98 Webb, Int
- 99 Miller quote, 4-16-62, U; Karth, Chenoweth and Miller quotes, 5-2 62, U
- 100 Miller quote, 1-17-62, U; Ducander, Int
- 103 Karth, Teague, Riehlman, and Mosher quotes, 4-10-11, and 1 6-62, U
- 105 Mosher quote from Volume 17, page 111, American Astronautical Society publication on "Proceedings of an AAS Symposium," 12-30-63, Cleveland, Ohio, paper by Mosher on "The Space Sciences on Capitol Hill."
- 105 6 Riehlman, Teague, Morris, Fulton and Ducander quotes, 4 11 62, U
- 106 Miller quotes, 4-15-62, 8-7-62, U
- 107 Miller quote, 9-26-62, U
- 107 Gilruth, Int
- 108 Webb quote, Hg, 2-27 62; Teague quote, Hg, 2-28-62
- 109 Seamans quote, Hg, 2 28 62; Holmes quote, Hg, 3-26-62; Roudebush quote, *Ibid.*, Teague and Rosen quotes, Hg, 4-4-62; Miller quotes, *Ibid.*, and CR, 5-23 62
- 110 Daddario, Riehlman, Hechler and Miller quotes, Hg, 7-12-62, von Braun quotes, Hg, 3-18 63

*Quotation or citation**Page*

- 111 Teague and von Braun quotes, Hg, 3-18-63; Daddario, Holmes and Shea quotes, Hg, 5-8-63; Fulton quote, Hg, 2-20-64
- 112 Teague and Gray quotes, Hg, 2-23-64; Teague, Int
- 113 Teague quote, Hg, 3-29-62; Teague, Int
- 114 Teague quote, 4-16-62; U, Petrone quote, Hg, 7-24-62
- 115 Teague, Int, H. Rept. No. 1959, 7-2-62; Centaur quote
- 116 Karth quotes, 6-27-62; U, Hg, 5-15-62
- 117 Karth quotes, Hg, 3-8-63
- 118 Teague quote, 5-10-62; U, quote from conference report, H. Rept. No. 2038, 7-26-62; Ducander, Int, Gould, Int
- 120-1 Gould, Int
- 124 Gross quote, CR, 5-23-62
- 127 Albert, Int
- 129 Miller quote, 2-5-63; U
- 130 Galloway, Int
- 131 Miller quote, CR, 9-11-63; Daddario, Int
- 132 Miller and Daddario quotes, Yeager, Int, Daddario, Int
- 134 Kistrakowsky quote in letter to Daddario, 9-11-63, reprinted in "Government and Science" Hg, p. 421; Stever letter, *Ibid.*, p. 425
- 135 DuBridge letter, *Ibid.*, p. 455; Revelle letter, *Ibid.*, p. 427; Urey letter, *Ibid.*, p. 426; Seitz quote, Hg, 10-15-63
- 136 7 Daddario quote, Hg, 11-5-63; Miller quote, *Ibid.*, von Braun and Revelle quotes, *Ibid.*
- 142 Miller quote, Hg, 1-26-65; McCormack quote, *Ibid.*
- 144 Letter, Wirths to Teague, 6-5-78, CF; Haworth to Teague, 6-30-78, CF
- 145 Mosher and Daddario quotes, CR, 4-12-67
- 147-9 Humphrey quote, Hg, 1-25-66
- 150 Letter, Brown to Miller, 9-23-69, CF
- 151 Daddario, letter of transmittal, 6-7-67, Rpt, Haworth to Teague, 6-30-78, CF
- 156 Revelle quote, Hg, 5-9-67; Haworth to Teague, *op. cit.*
- 158 Daddario quote, Hg, 7-10-69; Miller quote, *Ibid.*
- 159 Daddario and Fulton quotes, *Ibid.*, Rpt on technology assessment in committee print of "Report of Activities, Subcommittee on Science, Research and Development," 1966
- 160 Bills introduced by Daddario (H.R. 6698) and Mosher (H.R. 10146) to establish Technology Assessment Board
- 161-2 Haworth to Teague, 6-30-78, and Handler to Teague, 7-13-78, CF
- 163 Albert, Int
- 164 Teague, Int
- 165 Teague quote, Hg, 2-3-59; Teague, Int
- 166 Ford quote, remarks on 2-27-75, CF
- 168-9 Petrone quote, Int; Jensen and Teague quotes, CR, 5-23-62
- 170 Abelson quote, Science magazine, 4-19-63
- 171 President Eisenhower to Halleck, letter reprinted in CR, 4-2-63; The New York Times, 6-13-63
- 171-2 "Additional Views", minority, in H. Rept. 591, pages 201-5, 7-25-63
- 172 Teague quote, CR, 8-1-63
- 173 Miller, Martin and Teague quotes, *Ibid.*
- 174 Pelly and Fuqua quotes, *Ibid.*, Petrone quote, Int
- 175 Teague to Kennedy, 9-23-63, CF; Teague to O'Brien, 9-27-63, CF
- 176 Bundy to Teague, 10-4-63, CF
- 177 Teague to Webb, 1-10-64, CF
- 178 Subcommittee on Manned Space Flight, Report, 3-11-64; U; Teague quote, Hg, 2-18-64
- 180 Teague telegram to Dr. Milton Eisenhower, 5-28-64; Eisenhower to Teague, 6-2-64, CF
- 181 Teague to Adm. Burke et al., 6-10-64, CF; Teague quote, CR, 5-2-68
- 183-4 Ducander, Int
- 184-5 Miller quote, CR, 2-16-65
- 185 Roush quote, 4-29-65; U
- 186 Glennan, Int
- 187 Webb to Johnson, 5-23-61, copy in NASA Historical Files
- 188 Miller quote, 3-17-64, U
- 189 Quote from conference report, H. Rept. 514, 6-15-65, page 7
- 190 Fuqua quote, CR, 5-6-65; Teague quote, Hg, 3-10-66
- 191 "Future National Space Objectives," Rpt, committee print, 7-25-66; Webb to Teague, 12-1-66, CF

Quotation or citation

Page

- 192 Notes on 1-23-66 NASA meeting with Subcommittee on Manned Space Flight, copy in NASA Historical Files
- 193 Teague quote, CR, 5-3-66, Lt. Col. Edward H. White to Teague, 8-17-66, and Teague to White, 8-26-66, in Teague personal correspondence file, Teague observation to Silverstein, Hg, 2-18-60
- 195-6 Miller, Teague, Albert, Pelly, Roush, Fuqua quotes, CR, 1-30-67
- 196 Teague letter to members of Subcommittee on NASA Oversight, CF, 3-22-67, Winn and Webb quotes, Hg, 4-10-67
- 197-8 Letter from Phillips to J. L. Atwood, 12-16-65, and a copy of the Phillips Report are in NASA Historical Files
- 198 Quotes from Ryan, Wydler and Teague, and Messrs. Atwood and Myers are in Hg, 4-11-67
- 199 Quotes from Ryan, Teague, Mueller and Phillips in Hg, 4-12-67, Fuqua quote, Hg, 5-10-67
- 200 Miller to Webb, 5-17-67, CF, Borman to Teague, 5-31-78, CF, Petrone, Int
- 202-1 Wydler, Hg, 5-10-67, Frosch, NASA press release, 10-3-78
- 204 Berry to Teague, 5-1-67, Maj. Gen. Edward H. White to Teague, 4-18-67, Teague to White, 5-12-67, Teague personal correspondence file
- 205 Gross quote, CR, 6-27-67
- 206 Teague quote, Hg, 3-11-69
- 207 Mosher, Int
- 208 Casey, quote, CR, 6-10-69
- 209 Gilruth to Teague, 7-24-69, Teague personal correspondence file
- 212 Karth quote, CR, 8-1-63
- 213 Karth, Int
- 214 Chenoweth, Bisplinghoff quotes, 5-23-63, U
- 215 Hechler quote, Hg, 9-11-62
- 216 Hechler quote, CR, 8-1-63, Karth quote, CR, 5-2-68
- 217 Mosher quote, *Ibid.*; Seamans quote, Hg, 8-15-62
- 218 Hechler quote, 9-18-62 and 10-4-62, Hg
- 219 Karth quote, CR, 3-25-64
- 220 Karth, Ryan, Miller, Rumsfeld, Bisplinghoff quotes, Hg, 2-26-63
- 221 Hechler, Wydler, Roush, Davis, Seamans quotes, Hg, 3-20-63
- 222 Webb to Miller, 3-21-63, CF; Mosher, Morris, Kelley quotes, Hg, 4-3-63
- 223 Karth, Downing, Miller, Kelley quotes, 4-4-63; Miller quoted in The New York Times, 4-5-63
- 224 Karth, Int; Webb to Teague, 12-13-78, CF
- 225 Quote from H. Rept. No. 591, 7-25-63; Wydler quote, CR, 8-1-63
- 226 Martin quote, CR, 8-1-63
- 227 Miller, Wydler, Hechler, Pelly, Rumsfeld quotes, Hg, 3-5-64
- 228 Teague quote, CR, 3-25-64
- 229 Wydler, Sullivan quotes, Hg, 3-18-65; quote from committee report, Rpt No. 273, 5-3-65
- 230 Hechler, Roush, Myers quotes, Hg, 2-28-66, Wydler quote, 2-30-66, U
- 231 Webb to Miller, 3-31-64, CF
- 232 Webb-Dryden to Karth, 4-22-64, printed in Hg, 4-27-64
- 233 Karth quotes, Hg, 4-27-64, Hechler quote, *Ibid.*, Karth observations to Webb, Hg, 5-4-64
- 234 Quote from Ranger report, H. Rept. No. 1487, 6-16-64
- 235 Quote from 1963 committee report, H. Rept 591, 7-25-63, quote from 1965 Surveyor Report of Subcommittee on Oversight, Rpt, 10-8-65
- 236-7 Quotes from Mosher, Conable, Newell, 9-2, 3-65, Hg
- 238 Quotes from Karth, Mosher, Conable, Vivian, 3-7-66, U
- 240 Quotes from Karth, Mosher, Naugle, Hg, 2-27-68
- 241 Quote from committee report, H. Rept 1181, 3-19-68; quote from Mosher, CR, 5-2-68, Karth quote in Space Business Daily, 3-12-69, and in Hg, 3-12-69
- 242 Karth, Int; Karth and Roudebush quotes, CR, 8-1-63
- 243 Quotes from conference report, H. Rpt. No. 1529, 7-1-64; Karth quote, CR, 5-6-65
- 244 Winn quote, CR, 6-27-67; Roudebush quote, *Ibid.*, Karth, Fulton quotes, *Ibid.*
- 245 Karth quotes, CR, 5-6-65, CR, 5-2-68
- 247 Brooks quote, Hg, 4-20-61, quotes from Miller and Bass in committee Rpt, H. Rept 391, 5-12-61
- 250 Quotes from Hechler, Wydler, Wolff and Harper, Hg, 2-24-66
- 252 Hechler quote, CR, 6-22-67; Roush and Pelly quotes, 2-26-68; Hechler quote in 1968 hearings, Hg, 9-24-68
- 253 Pelly, Welsh, Paine quotes, *Ibid.*
- 254 Hechler and Anders quotes, Hg, 12-1-69
- 255 Paine quote, 12-8-69

*Quotation or citation**Page*

- 256 Quotes from Fulton and Bell, H. Rept. 273, 5-3-65, Rpt
 258 Roush quote, Hg, 7-29-68
 259 Roush and Pettis quotes, *Ibid.*
 260 Miller, Roush, Rumsfeld, Hechler quotes, Hg, 3-13-63
 261 Admiral Boone, quoted from Boone, *NASA Office of Defense Affairs*, Chapter VII; Roush quote, CR, 3-25-64
 264 Stoller quote, Hg, 3-5-62; Simpson quote, Hg, 6-6-63
 265 Frey quote, H. Rept. No. 91-255, 5-19-69
 269 Miller quote, CR, 8-11-69
 270 Teague quote, "Future National Space Objectives," committee print, Rpt, 7-26-66
 271 Miller memorandum to committee members, 2-11-70, CF; Miller quote, Hg, 2-17-70
 272 Karth and Myers quotes, Hg, 2-20-70
 272-3 Fulton quote, 3-5-70, U; Karth, Miller, Mosher, Hammill quotes, 3-2-70, U
 274 Teague statement, confidential source
 275 Subcommittee on Manned Space Flight report, 3-5-70, U; Mosher, Karth, Fuqua, Downing, Hechler quotes, *Ibid.*
 276 Teague quote, *Ibid.*; Mosher memorandum to Republican members, 4-10-70, CF
 277 Miller, Mosher, Karth quotes, CR, 4-23-70
 278 Gross, Roudebush, Karth, Fuqua quotes, *Ibid.*; Frey, Int
 279 Ford quote, CR, 4-23-70
 280 Quotation from "The National Space Program—Present and Future", committee print, Rpt, Dec. 10, 1970
 281 Letters to Teague and Miller, cited, CF; Fletcher interview in Washington Sunday Star, 2-28-71
 282 Teague and Fulton telegram to Fletcher, 3-1-71, CF; Casey quote, CR, 6-3-71
 285 Mosher quote, 3-30-71, U; Wydler, Karth, Teague quotes, 3-30-71, U
 286 Wydler quote, *Ibid.*; Fuqua-Frey statement, H. Rept. No. 92-143, 4-1-71
 287 Fletcher, Int
 288-9 Fuqua and Frey quotes, Hg, 2-8-72
 289 Teague quote, Hg, 2-17-72
 290 Teague, Abzug quotes, Hg, 3-14-72
 291 Abzug, Winn, Wydler, Fuqua quotes, *Ibid.*
 292 Teague quote, *Ibid.*
 293 Mosher, Wydler, Boggs quotes, CR, 4-20-72
 294 Miller to Fletcher, 1-28-72, CF
 297 Abzug quote, CR, 5-23-73; Teague quote, *Ibid.*
 298 Fuqua and Myers quotes, Hg, 2-19-74; Mosher quote, CR, 6-12-74; Winn quote, CR, 4-9-75
 299 Abzug, Badillo, *Ibid.*; Fuqua, Winn quotes, CR, 3-22-76
 300 Frey quote, *Ibid.*; Stafford quote, Hg, 1-26-78; Lloyd quote, *Ibid.*
 301 Winn quote, Hg, 2-23-78
 303 Fuqua and Winn quotes, CR, 3-28-79
 304 Winn, Fuqua, Frosch, Yardley quotes, Hg, 6-28-79
 305 Frosch quote, *Ibid.*; Fuqua and Winn quotes, statements on release of report of Subcommittee on Space Science and Applications, 8-30-79
 307 Roudebush quote, CR, 4-23-70
 308 Teague to Nixon, 11-5-69, CF; Bell, Goldwater and Fulton quotes contained in H. Rept. 92-143, 4-1-71
 309 Quote from S. Rept. 92-146, 6-8-71; Myers quote, 2-17-72
 311 Esch quote, Hg, 7-17-73; Fuqua quote, Hg, 8-1-73
 312 Fuqua quote, *Ibid.*; Bell and Fuqua quotes, CR, 6-12-74; Fuqua letter to Lindsey, 7-23-79, CF
 313 Fulton and Wydler quotes, 3-5-70, U
 314 Karth and Fulton quotes, *Ibid.*
 315 Miller quote, Hg, 3-2-71; Miller address in Rome, 5-3-71, CF; Teague quote, CR, 6-3-71
 316 Transcript of executive session, 3-16-72, U
 318 Miller to Fletcher, 12-26-72, CF
 320 Teague statement, 4-24-73, CF; Teague, Int
 321 Karth quote, CR, 4-23-70
 322 Quotes from Karth address to American Institute of Aeronautics and Astronautics, 4-1-71, CF
 323 Karth quote, CR, 6-3-71; Downing to Miller, 12-10-71, CF
 325-6 Downing subcommittee report, 3-23-72, U; Downing quote on funding space applications, CR, 4-20-72
 328-9 Symington quote, Hg, 1-27-72; Symington quote from first subcommittee hearing, Hg, 3-1-73, Bergland, *Ibid.*

Quotation or citation

Page

- 330-1 Esch, Symington, Camp, Mathews quotes, 9-24 to 10-4-73, U
- 331 Symington quote, opening Viking oversight hearings, Hg, 11-21-74
- 332 Symington, Int, Winn quote, Hg, 11-21-74
- 335 Winn quote, 3-5-75, U
- 336 Quote from report of Subcommittee on Space Science and Applications, 3-11-75, U, quote from conference report, H. Rept. 94-259, 6-4-75
- 337 Quotes from Rpt "Future Space Programs," 9-75
- 339 Fuqua quote, Hg, 6-21-77; Fuqua to Press, 11-29-77; Press to Fuqua, 12-6-77, CF
- 340 Fuqua quotes, Hg, 5-2, 5-3-79, Brown quote, 5-3-79, Frosch quote, Hg, 1-26-78
- 341 Wydler, Press, Winn, Fuqua quotes, Hg, 1-26-78
- 341 Fuqua quote, CR, 4-25-75
- 341 Fuqua to Press, 10-20-78, CF
- 343 Fuqua, Wydler quotes, Hg, 2-14-79
- 344 Fuqua quote, Hg, 5-23-79
- 345 Rangel quote, CR, 4-20-72
- 346 Bell, Pelly, Rangel, Teague, Miller, Dellums quotes, *Ibid.*
- 347 Teague, Hechler quotes, CR, 5-23-73
- 348 Teague quote, 4-17-73, U, Hechler, Downing quotes, *Ibid.*
- 349 Milford, Winn, Hechler, Teague quotes, *Ibid.*
- 350 Hechler to Fletcher, 6-18-73, CF, Fletcher to Hechler, 6-29-73, CF, Hechler to Teague, 7-31-73, CF
- 353 Hechler, Day, Low quotes, Hg, 2-26-70
- 354 Low quote, *Ibid.*; committee report, H. Rept. 91-929, 3-19-70, Coughlin quote, CR, 6-3-71
- 355 Hechler and Farley quotes, Hg, 3-15-73; Hechler and Gray dialogue, Hg, 3-5-74
- 356 Fuqua quote, Hg, 2-25-75
- 357 Quote from S. Rept. 94-103, 5-5-75; Winn quote, CR, 3-22-76
- 358 Mogavero quotes, Hg, 2-7-78
- 359 Quote from committee report, H. Rept. 95-973, 3-15-78; Fuqua and Calio exchange, Hg, 9-26-78
- 360 Teague quote, Hg, 2-26-70 (technology utilization), committee report on NASA public affairs program, H. Rept. No. 91-255, 5-19-69
- 362 Casey, Int
- 363-4 Fletcher commentary on committee public affairs report, 9-13-74, CF; copy of the committee report is in CF; Fletcher to Teague, 5-24-78, CF
- 365 Fuqua statement, Hg, 7-19-79
- 368 McCormack, CR, 6-2-58
- 369 Quote from "U.S. Policy on the Control and Use of Outer Space," H. Rept. 353, 5-11-59
- 371 Quotation from Corliss, William R., *Histories of the Space Tracking and Data Acquisition Network, the Manned Space Flight Network, and the NASA Communications Network*, NASA June, 1974
- 373 Anfuso telegram to Brooks, 5-10-60, CF; Wolf letter to Brooks, 5-13-60; Killian, *Suprnik, Scientists and Eisenhower*, p. 52
- 374 Anfuso and Dryden quotes, Hg, 2-15-61, Kerr, "Congressmen as Overseers", *op. cit.*
- 375 "Air Laws and Treaties of the World," committee print, 5-11-61; Philip M. Smith to Teague, 6-1-78, CF
- 377 Dryden, Hg, 3-4-63
- 378 Teague, H. Con. Res. introduced 4-18-62
- 379 Kerr, *op. cit.*
- 380 Frutkin to Teague, 6-9-78, CF
- 381 Findley and Fulton quotes, CR, 5-3-66
- 382 Fulton, Hg, 1-25-66; Rusk, Hg, 1-24-67; Handler, *Ibid.*
- 383 Panel report to committee quoted, Hg, 1-25-68; Daddario quote, *Ibid.*, Daddario to Nixon, 11-26-68, CF
- 384 McCormack quote, Hg, 1-23-68
- 385 Rogers quote, Hg, 1-26-71; Miller quote, Hg, 1-25-72
- 387 Handler to Teague, 7-13-78, CF
- 388 Quotes from OECD and Miller are from the official proceedings published by OECD, 1968
- 389 A copy of Miller's address in Belgrade, 8-28-68 is in CF
- 390 Solandt quote, Hg, 1-24-68, Gould to Greenwood, 11-20-67, CF
- 391 Daddario to Connolly, 3-26-68 CF, Miller, CR, 5-13-68
- 392 Daddario, Fulton, Grosart statements, 2-9, 10-70, CF
- 393 Grosart quote, Hg, 1-27-71
- 394 Symington, Roudeshush, Fulton quotes, CR, 8-11-69

Page

Quotation or citation

- 395 Lowenstein, Rondebush quotes, *Ibid.*
 396 Miller, Fulton, Teague, Karth quotes, 1-30-69, U
 397 Frutkin to Miller, 9-8-70, CF
 398 Ducander to Miller, 2-24-71, CF
 400 Winn quote, Hg, 5-19-71, Brown, *Ibid.*
 401 Fuqua quote, Hg, 5-20-71
 402 Kennan and Malone quotes in "A Reader in International Environmental Science," 5-18-71, Rpt.,
 Tram and Walker quotes, Hg, 5-25-71
 405 Ducander to Miller, 12-8-71, CF
 406 Miller to Priestman, 3-3-72, CF, Christensen to Miller, 4-28-72, CF
 407 Symington quote, Hg, 6-13-72, David and Handler quotes, Hg, 6-14-72
 408 Mosher quote, Hg, 6-13-72, Hanna and Teague quotes, 2-28-73, U
 409 Quote from Hanna address to American Institute of Aeronautics and Astronautics, 3-13-73, copy
 in CF, Hanna remarks at subcommittee organization meeting, 6-5-73, U
 410 Goldman quote, Hg, 12-4-73
 411 Roe quote, Hg, 12-6-73, Stever quote, Hg, 5-21-74, Winn quote, *Ibid.*
 412-3 Low to Miller, 11-2-70, CF
 414 Miller to all committee members, 11-16-70, CF, Ambartsumian quote, Hg, 1-26-71, Low quote,
 Hg, 3-2-71
 415 Murphy quote, Hg, 5-18-71, Fuqua quote, Hg, 3-2-72, Price quote, Hg, 3-2-72; Teague quote, Hg
 5-31-72
 416 Price and Hechler quotes, Hg, 6-15-72, Teague, Int
 417-8 Teague, Int, Miller to Fletcher, 6-27-72, CF, quote from Houston Chronicle, 1-7-73; Teague corre-
 spondence in Teague personal correspondence file
 419 Winn quote, 3-7-73; Gunter quote, *Ibid.*, Teague to Fletcher, 5-1-73, and Fletcher to Teague,
 5-17-73, CF
 420 Fuqua to Myers, 9-12-73, CF, Wydler and Lee quotes, 10-2-73, U
 421 Teague, Winn, Swigert, Low quotes, *Ibid.*, Teague to Fletcher, 10-15-73, CF
 422-3 Fletcher to Teague, 11-19-73, CF, Teague to Fletcher, 12-5-73, CF; Fuqua, Camp and Winn quotes,
 Hg, 2-21-74, Teague quote, CR, 7-22-74
 424 Roe quote, 1-29-75, U
 428 Thornton quote, Hg, 10-28-75, Hg, 11-18-75
 429 Mosher quote from committee report published in September, 1976
 431 Scheuer quote, 2-24-77, U
 432 Scheuer to Teague, 12-24-78, CF
 434 Conyers quote, Hg, 6-22-77; Carter to Scheuer, 12-28-77, Scheuer personal correspondence file
 435 Fuqua to Davis, 4-4-79; Scheuer to Vance, 2-27-78, CF
 436 Fuqua quote, CR, 3-27-79
 437 Teague to Zablocki, 4-6-78, CF, Fuqua quote, CR, 7-12-79
 438 Scheuer to Teague, 7-28-78, CF, Hollenbeck et al. to Press, 2-1-79, CF
 439 Quote from NSF Authorization Report, H. Rept. No. 96-61, 3-21-79; Teague to Zablocki, 12-21-78,
 CF; Brown quote, Hg, 7-17-79
 440 Wells to Gould, 12-14-77, CF
 443 Wydler to Carter, 4-4-78, CF, Forsythe, Brown, and Walker quotes, CR 9-25-78
 446 Fuqua testimony before House Foreign Affairs Committee, 3-14-79, copy in CF
 447 Brown, *Ibid.*
 451 Teague to Polk, 11-27-78, CF, Astin testimony, Hg, 5-21-59
 452 Fulton and Hechler quotes, *Ibid.*; Brooks query, Hg, 3-3-61
 453 Miller, Int; Mosher quote, Hg, 6-28-61
 454 Hechler quote, *Ibid.*, Miller quote, 7-21-61, U; Gross quote, CR, 4-16-62
 455 Legislative Reference Service, "Notes on Conversion to the Metric System," Rpt, 7-19-62
 456 Miller quote, Hg, 8-2-65; Wolff quote, Hg, 8-5-65
 457 Fulton quote, *Ibid.*, Wydler and Miller exchange, Hg, 8-4-65; quotes from committee report on
 metric system, H. Rept. 850, 8-24-65
 458 Representatives Howard W. Smith and H. Allen Smith quotes, The New York Times, 9-10-65
 459 Wydler and Hollomon exchange, Hg, 1-18-66, committee report on metric system, H. Rept. No.
 1291, 2-17-66
 460 Miller, Fulton and Wydler quotes, 2-21-67, U, committee report on metric system, H. Rept. No. 33,
 3-6-67
 461 Anderson, Gross, Martin and Pettis quotes, CR, 6-24-68
 462 Miller, Roush, Hechler, Ichord quotes, *Ibid.*

- Quotation or citation*
- Page*
- 464 Miller, Branscomb quotes, Hg, 9-14-71
- 465 Hechler, Mosher, Branscomb quotes, *Ibid.*; Fulton and Branscomb exchange, Hg, 9-23-71
- 467 Teague, statement on metric system, 1-3-73, CF
- 468 Davis, Pickle, Symington quotes, Hg, 3-19-73
- 469 Roberts quote, *Ibid.*; Peterson quote, Hg, 3-20-73; Mosher quote, *Ibid.*; Gross and Davis quotes, Hg, 5-1-73
- 471 Minutes of House Committee on Rules, 10-25-73, include Davis quotes
- 472 Pepper quote, *Ibid.*; Teague to Madden, 1-24-74, CF
- 473 Teague-Mosher letter, 5-2-74, CF
- 474 McCollister letter, 5-3-74, CF; Teague, Davis and Gross quotes, CR, 5-7-74
- 475 Wall Street Journal, 5-10-74; Teague newsletter, June, 1974; Teague personal correspondence file, notes on metric strategy meeting, 6-10-74, CF
- 476 Symington quote, Hg, 4-29-75
- 477 Peterson quote, Hg, 4-30-75
- 478 Symington quote, *Ibid.*; Tirrell, Hg, 5-1-75; Symington subcommittee markup, 5-21-75, U
- 479 Lloyd, Symington, Emery and Fuqua quotes, *Ibid.*
- 480 Symington and Wydler quotes, 6-16-75, U
- 482 Scheuer and Symington quotes, *Ibid.*
- 482 Quillen quote, CR, 9-5-75
- 483 Teague, Symington, Matsunaga and Mosher quotes, *Ibid.*; Teague, Int
- 484 Fuqua, Hechler, Goldwater and Emery quotes, CR, 9-5-75
- 485 Teague memo to Symington and Mosher, 12-8-75, CF; Ford to American National Metric Council, 12-31-75, copy in CF
- 486 Carter to American National Metric Council, 3-12-77; Teague to American National Metric Council, 5-6-77, copy in CF
- 487 Copies of Teague-Hopkins-Baruch correspondence in CF
- 488 Teague statement on metric system, with attached correspondence, CR, 6-9-77
- 489 Teague, Int; Teague to Carter, 7-14-77, CF; Cox to Teague, 8-19-77, CF
- 490 Teague memorandum to radio, television and news executives, 9-6-77, copy in CF
- 491 Teague-McClory letter on metric strategy, 7-29-77, CF
- 492 U.S. Senate Committee on Commerce, Science, and Transportation, Hg, 3-17-78; Hannigan quote; Polk quote, *Ibid.*; Rudd and McCormack quotes, CR, 7-13-78
- 493 McCormack and Downey quotes, CR, 7-20-78
- 494 Rudd bill to repeal the Metric Conversion Act of 1975, H.R. 12881, introduced 5-24-78; Greene in Chicago Tribune, 8-16-78; General Accounting Office Report, "Getting a Better Understanding of the Metric System—Implications if Adopted by the United States," 10-20-78, copy in CF
- 495 Teague to Polk, 11-27-78, CF; Fuqua to Polk, 2-7-79, CF
- 496 Fuqua to Willson, 5-24-79; Fuqua to Gross, 6-27-79, CF
- 497 Crane and McCormack exchange, CR, 7-12-79
- 499 Wirths quote on Yeager, Wirths to Teague, 6-5-78, CF
- 500 Daddario quotes, 3-24-70, U; Mosher quote, *Ibid.*
- 500-1 Roudebush, Gross, Symington and Miller quotes, CR, 5-11-70
- 502 Davis and Bisplinghoff quotes, Hg, 3-25-71; Davis to McElroy, 2-2-71, CF; Mosher quote, Hg, 2-25-71
- 503 McCormack quote, 4-20-71, U; Humphreys to Teague, 6-8-78, CF; Handler quote, Hg, 4-7-71
- 504 Miller quote, CR, 6-7-71; Davis to Nixon, 9-14-71, CF
- 506 Symington quote, CR, 4-25-72; Davis to Stever, 1-26-73, CF
- 506-7 Davis quote, CR, 2-5-73; see also Hg, 2-25-73
- 508 Pickle quote, Hg, 2-25-73; Conlan memorandum to Davis, 3-30-73, CF; Martin and Davis quotes in markup session of Subcommittee on Science, Research and Development on National Science Foundation authorization bill, 4-11-73, U
- 509 "Additional Views" of Wydler, Bell, Winn, Goldwater and Camp on NSF authorization bill, H. Rept. No. 93-284, 6-14-73
- 510 Roncallo quote, CR, 6-22-73
- 512 Mosher, Bell and Flowers quotes in markup session of Subcommittee on Science, Research and Development on NSF authorization bill, 3-28-74, U
- 514 Symington quote, Hg, 1-24-75
- 515 Salter quote, Hg, 1-29-75; Symington quote, Hg, 1-30-75; Stever and Mosher quotes, Hg, 2-5-75
- 516 Conlan quote, Hg, 2-5-75; Symington quote, 2-27-75, U; Flowers quote, *Ibid.*, U
- 518 Conlan amendment on MACOS, 3-6-75, U
- 519-20 Ottinger, Wydler, Teague, Conlan, Fuqua and Symington quotes, 3-19-75, U

Page

Quotation or citation

- 520 Mosher quote, CR, 4-9-75
- 521 2 Conlan, Teague, Mosher, Symington, Wydler, Ottinger, Mrs. Lloyd and Wirth quotes, *Ibid.*
- 523 Conlan quote, Hg, 7-22-75; Atkinson quote, Hg, 7-24-75
- 524 Harkin quote, Hg, 7-23-75; the Moudy Report is published as a committee print, 11-75, entitled "National Science Foundation Curriculum Development and Implementation for Pre-College Science Education."
- 525 Conlan quote, Hg, 7-22-75; Stever to Symington, 1-19-76, CF
- 526 Quote from committee print on "National Science Foundation Peer Review", 1-22-76, Rpt
- 527 Teague quote, CR, 3-25-76; Fuqua quote, *Ibid.*
- 528 Bauman and Conlan quotes, *Ibid.*; Wirth quote, *Ibid.*
- 529 30 Symington and Mosher to Kennedy and Laxalt, 6-4-76, CF; additional letter, 7-2-76, CF; Wells to Teague, 7-8-76; Teague to members of conference committee, 7-22-76, CF
- 531 McCormack to Teague, 9-1-76; Wells to Teague, 9-15-76, CF
- 532 Yeager to Teague, 9-21-76, CF; Mosher quote, CR, 9-29-76
- 533 Brown, Hg, 2-1-77
- 534 5 McCormack, Harkin and Fuqua quotes, 3-2-77, U; Myers quote, *Ibid.*
- 536 Flowers and Ottinger quotes, *Ibid.*
- 538 Hollenbeck quote, Hg, 1-31-78
- 539-40 Flowers, Harkin, Wydler and Scheuer quotes during committee markup of NSF authorization bill, 3-14-78, U; Harkin quote during House debate, CR, 4-18-78
- 541 Ashbrook and Harkin quotes, *Ibid.*
- 542 Rousselot, McCormack, Ashbrook, Teague and Martin quotes, *Ibid.*
- 544 Brown and Hollenbeck quotes, Hg, 2-15-79
- 546 Hollenbeck quote, CR, 3-27-79; Ashbrook and Pease quotes, *Ibid.*
- 547 Hollenbeck quote, CR, 7-13-79
- 548 Fuqua quote, CR, 6-13-79
- 549 Brown statement, Hg, 5-16-79; Daddario to Lindbergh, 4-8-70, CF; Lindbergh to Daddario, 4-15-70, CF
- 550 Daddario quote, Hg, 3-14-70
- 551 Brown quote, *Ibid.*; Symington quote, Hg, 5-28-70
- 552 Daddario quote, Hg, 5-20-70; Daddario-Mosher "Dear Colleague" letter, 7-13-70, CF
- 552-3 Wydler-Davis exchange, 8-6-70, U; Gross quote, CR, 9-16-70
- 555 Bell and Pelly amendments, 7-22-71, U
- 559 Davis and Mosher quotes, CR, 2-8-72
- 561 Yeager, Int
- 562 Wall Street Journal, 3-27-73; Mosher, Int
- 564 Teague, final report as Chairman of Technology Assessment Board, 12-76, CF
- 564 Thornton quote, Hg, 8-3-77;
- 565 Quote from committee print entitled "Review of the Office of Technology Assessment and its Organic Act," 11-78; Fuqua to Brademas, 3-20-79, CF; Gross quote, CR, 4-29-74
- 566 Miller quote, 7-9-70, U
- 568 Mosher to Miller, 5-1-70, CF; Steele quote, Hg, 10-10-70; Miller quote, *Ibid.*
- 569 Mosher and Miller quotes, *Ibid.*
- 571 Goodling quote, CR, 4-29-74; Symington quote, Hg, 1-22-76
- 572 Fuqua and Tipton quotes, *Ibid.*; Fuqua quotes in markup of fire bill in Subcommittee on Science, Research and Technology, 3-3-76, U; Mosher quote, CR, 3-24-76
- 573 Flippo and Hollenbeck quotes, Hg, 2-2-78; Lloyd, *Ibid.*
- 574 Brown quote, Hg, 4-27-79
- 575 Hollenbeck quote, Hg, 2-9-78; Branscomb quote, Hg, 8-3-71
- 576 Davis quote, CR, 4-25-72; Roberts quote, Hg, 1-27-75; Astin to Teague, 5-26-78, CF; Brooks quote, Hg, 5-7-59
- 579 Peck, quote, Hg, 10-1-77; Teague quote, CR, 6-28-78
- 580 Symington quote, CR, 6-17-76
- 581 Thornton quote, Hg, 6-29-77
- 582 Teague to McIntyre, 9-7-78, CF
- 583 Fuqua statement, 3-8-79, CF; Hollenbeck, CR, 3-14-79; Wydler, *Ibid.*; Ambro quote, Hg, 6-26-79
- 584 Symington quote, Hg, 6-22-76; Goldwater quote, 7-29-76, U
- 585 Brown, *Ibid.*, and 8-10-76, U; Dornan quote, 4-26-77, U
- 587 Thornton quote, Hg, 3-29-77; Hollenbeck, *Ibid.*
- 589 Teague quote, Rpt, 3-1-77
- 590 Thornton statement in releasing DNA Rpt, 4-3-78
- 591 Thornton quote, Hg, 4-11-78

- Quotation or citation*
- Page*
- 592 Thornton, Int
- 594 Brown quotes, Hg, 6-19-78
- 595 Brown quotes, 8-1-78 Hg., Thornton and Hollenbeck quotes, 8-8-78, U, Wydler quote, *Ibid*
- 596 Brown statement, 11-4-78, CF
- 597 Andrews quote, CR, 6-19-79
- 599 Miller quote, Hg, 9-27-72, Brown statement, 7-2-79, CF
- 600 Brown and Pease statements at forum, 6-5-79, CF; Brown-Simon statement, 7-23-79, CF
- 602 Thornton quote from committee print, "Domestic Technology Transfer: Issues and Options," 11-78
- 603 Brown statement, 9-4-79, CF, 9-11-79, CF, Ertel, *Ibid*.
- 605 Teague quote, Hg, 7-17-73, Ford, Int; Goldwater, Hg, 7-19-73
- 606 Hechler quote, Hg, 7-1-73, Symington-Stever exchange, *Ibid*.
- 608 Lindbergh to Daddario, 4-15-70, CF; quotes from committee print, "Toward a Science Policy for the United States," Rpt, 10-15-70
- 610 Daddario quote from committee print on "The National Institutes for Research and Advanced Studies," 4-15-70
- 612 Ratchford memo to Symington, 2-6-73, CF
- 613 Yeager to Teague, 5-3-73, CF
- 613 Teague testimony before House Select Committee on Committees, 6-8-73, Teague statement, 7-5-73, CF; Teague quote, Hg, 7-17-73
- 614-5 David quote, 7-24-73, Hg, Symington, Hechler and Carey quotes, *Ibid*.
- 617-9 Mosher to Stever, 6-17-74, CF, Teague quotes, Hg, 6-20-74, Kennedy-Hechler exchange, *Ibid*
- 619 Seamans, Fuqua, Goldwater and Symington quotes, Hg, 6-25-74
- 620 Handler, Killian and Symington quotes, Hg, 6-26-74
- 621 Davis and Hechler quotes, *Ibid*; Price quote, Hg, 7-9-74
- 622 Brown-Price exchange, *Ibid*; Mosher quote, Hg, 7-10-74
- 623 Teague and Mosher quotes, *Ibid*; Teague remark on drafting a bill, Hg, 7-11-74
- 624 Mosher, Int; Ford, Int
- 625 Mosher, Int, Stever to Teague, 6-1-78, CF
- 626 Ford, Int
- 627 Yeager, staff memorandum, 9-23-74, CF
- 628 Yeager to Cannon, 2-6-75, CF
- 629 Yeager quote, *Ibid*; Teague quote, CR, 3-6-75
- 630 Mosher, *Ibid*; Teague to Ford, 3-18-75, CF; Teague to Rockefeller, 5-1-75, CF
- 631 Teague statement, 5-22-75, CF
- 632 Rockefeller quotes, Hg, 6-10-75
- 633 Mosher, Symington and Rockefeller exchanges, *Ibid*.
- 634 Wydler quote, *Ibid*.
- 635 McCormack and Wydler quotes, Hg, 6-11-75; Mosher-David exchange, Hg, 6-17-75
- 637 Teague quote, CR, 7-30-75
- 638 Brown to Teague, 8-29-75, CF
- 639 McCormack to Teague, 9-18-75, CF; Ford to Teague, 10-8-75, CF
- 640 Wydler, Mosher, Teague, McCormack and Brown quotes, 10-9-75, U
- 642 O'Neill quote, CR, 11-6-75; Mosher quote, *Ibid*.
- 643 Rockefeller to Kennedy, 12-3-75, copy in CF; Kennedy to Rockefeller, 12-8-75, copy in CF; Yeager memo, 2-10-76, CF
- 644 Ford, message to Congress, 3-22-76, copy in CF
- 645 Kennedy, Moss and Teague exchanges, copy of transcript of conference committee proceedings in CF
- 646 Teague, Fuqua, Kennedy, Ford and Mosher quotes, *Ibid*
- 648 Brown and McCormack quotes, CR, 4-29-76; Mosher, Int
- 649 Helms, Curtis, Hansen and McClure to Ford, 6-9-76, copy in CF; Mosher response, 6-11-76, CF; Teague response, 6-17-76, CF
- 650 Thornton-Stever exchange, Hg, 7-20-76
- 651 Teague to OMB, 4-16-77, CF
- 652 Teague statement prepared for House Government Operations subcommittee, 8-3-77, CF; Teague to McIntyre, 9-27-77, CF, Mosher, memo to committee members, 10-17-77, CF
- 653 Mosher quote, *Ibid*
- 654 Fuqua, Int
- 656 McCormack, Int
- 657-9 McCormack to Miller, 7-1-71, CF
- 660-1 Ratchford to Ducander, 7-13-71, CF
- 661-2 McCormack, Int; Miller to Davis, 7-19-71, CF

*Quotation or citation**Page*

- 662 Quote from Davis, memo to members, 7-22-71, CF
 663 Miller to chairmen of House and Senate committees, 8-5-71, CF
 664 McCormack, Int
 666 Davis to Miller, 2-23-72, CF; Davis quote, Hg, 5-9-72, Miller quote, CR, 11-19-71
 667 Miller quote, Hg, 5-9-72, Miller address on solar energy, CR, 5-31-72
 668 Miller to members of Research Management Advisory Panel, 10-11-72, CF, McCormack, Int
 668-9 Quotes from final report of task force, "Energy Research and Development," committee print, 1973
 669 McCormack, Int
 670 *Ibid.*, no written record was kept of Democratic caucus of committee members, and this account is drawn from personal recollections of those attending.
 671 Teague quote, 2-26-73, U
 673 McCormack quote, Hg, 5-3-73; Reuss quote, Hg, 6-19-73
 674 McCormack, Int
 675 *Ibid.*
 676 Wydler quote, 12-14-73, U
 677 McCormack testimony before House Government Operations Committee, 11-28-73, U
 678-9 Hechler-McCormack exchange, 12-14-73, U, Teague to Ash, 2-8-74, CF
 679 Mosher quote, CR, 2-13-74
 680 Mosher, Wylie, Teague quotes, *Ibid.*; McCormack, Int
 681 Teague to Nixon, 10-16-73, CF
 682 Ash to Teague, 11-5-73, CF; Ash to Teague, 2-25-74, CF
 683-4 Teague to Ash, 3-18-74, CF; McCormack quote, 3-20-74, U
 685 Hechler, CR, 4-25-74
 686 McCormack quote, 8-9-74, U, Teague to members of House Committee on Rules, 7-15-74, CF
 687 Ratchford, Int
 688 Zarb quote, Hg, 7-30-74; Haley to Teague, 8-13-74, CF; Symington quote, 8-9-74, U
 690 Teague to Fletcher, 11-29-73, CF; McCormack quote, 4-10-74, U; Ratchford quote, *Ibid.*
 691 McCormack quote, *Ibid.*; Brown quote, CR, 7-10-74, Goldwater, *Ibid.*; Holifield quote, *Ibid.*
 692 Mosher quote, CR, 8-21-74
 696 Report of Monroney-Madden Joint Committee on the Organization of Congress, 1966
 698 Symington, Int.; McElroy, Int
 699 Karth, Int
 700-2 Davis, Mosher, and Martin quotes, Hearings before House Select Committee on Committees, 5-11-73; Bolling quote, *Ibid.*, 6-8-73
 703 Brown quote, House Select Committee on Committees, 9-13-73
 704-5 Mosher quote, *Ibid.*, 5-11-73
 707 Swigert memo to all staff members, 2-8-74, CF
 709 Hansen, Int
 711 Swigert summary of Hansen and Bolling reforms, with charts, 9-26-74, CF
 712 Teague quote, CR, 9-30-74
 714-7 No documentary record has been kept on the boat trip, and this account is drawn from a wide number of interviews with members and staff.
 715 Bingham statement, record of Democratic caucus decision, 12-8-76, copy in CF; Memorandum of understanding on nuclear R. & D. jurisdiction, CR, 1-14-77; McCormack-Wright exchange, *Ibid.*
 719-20 Teague, Int; Teague-Price exchange, CR, 9-13-77; Teague to Price, 5-9-78
 721 Brown quotes, H. Rept. No. 95-1166, Part 3, page 79
 723-4 Swigert memo, 7-18-73, CF; Mosher to Teague and Swigert, 7-18-73, CF
 725-6 Teague-Mosher exchange, 1-23-75, U
 728 Mosher quote, Int; Wydler testimony before House Administration Committee, 3-1-78, CF
 729 Teague to Thompson, 4-19-78, CF
 730-1 Miller, Fulton, Karth, Hechler, Teague, Wydler, Frey quotes on subcommittee chairman's power to appoint a staff member, 2-23-71, U
 732 Ducander to Miller, 2-24-71, CF
 734 Swigert memo to Teague on "Special Investigations and Oversight Task Team," 10-9-75, CF
 735 Teague instructions on how Dr. Dillaway should operate, from notes by Colonel Gould, CF, Teague memo to all committee members on methods of operation for the investigations subcommittee, 2-3-76, CF
 736 Gould to Swigert memo, 5-25-76, CF, Mosher quote, Hg, 8-10-76; Goldwater quote, *Ibid.*
 737 Teague, Int; memorandum to House Government Operations Committee on decision to disband the Subcommittee on Special Studies, Investigations, and Oversight, 2-18-77, CF

Quotation or citation

Page

- 735 Choice of subcommittee chairmanships and subcommittee assignments are detailed in record of committee Democratic caucus, 2-1-79, U
- 743 Roodzant testimony before committee, 5-10-76, U
- 744 Teague statement at news conference, 4-7-77, CF
- 746 Teague statement on violation of Federal laws covering the handicapped, 2-24-78, CF
- 746-7 Teague to Carter, 3-22-78, CF
- 747-8 Watkins, et al., letter to Fuqua on space-age technology to aid the elderly and handicapped, 2-13-79, CF
- 748 Fuqua to Frosch, 5-15-79, CF
- 749 Hechler quotes on need to train young scientific and engineering personnel, CR, 4-23-70
- 750-1 Hechler, Goldwater, Cabell, Low quotes, Hg, 2-25-70, Miller quote, CR, 4-23-70
- 752 Jackson quote, Hg, 3-23-71; Cortright-Hechler exchange, *Ibid.*
- 753 Hechler quote, Hg, 3-23-71, Wydler statement in H. Rept. No. 92-143, 4-22-71
- 754 Quote from conference report, H. Rept. No. 92-368, 7-21-71, Hechler quote, Hg, 1-18-72
- 755 Fletcher to Hechler, 1-14-72, CF, Miller quote, Hg, 1-18-72, Mosher quote, *Ibid.*; Quote from subcommittee report on "Civil Aviation Research and Development," H. Rept. No. 92-1423, 9-72
- 756 Hechler to Nixon, 1-20-72, CF; Hechler quote, Hg, 2-8-72
- 757 Hechler, Wydler and Seiberling quotes, 3-22-72, U
- 758 Mosher quote, *Ibid.*
- 759 Winn quote in committee report, H. Rept. No. 92-976, 4-11-72, Hechler quote, Hg, 3-20-73
- 760 Wydler quote, *Ibid.*
- 761 Symington-Fletcher exchange, Hg, 3-22-73, Wydler quote, Hg, 3-6-73
- 763 Mosher-Goldwater-Hechler exchange, Hg, 3-8-73
- 763-4 Wydler quote, Hg, 3-15-73
- 764 Hechler report to full committee, 4-17-73, U
- 765 Wydler quote, Hg, 12-5-73
- 766 Fletcher to Teague, 5-24-78, CF; Hechler quote from letter of transmittal, 12-9-74, of committee print entitled "Hydrogen as an Aviation Fuel."
- 768 Hechler-Meyer-Butterfield exchange, Hg, 7-25-74
- 769 Hechler quote in subcommittee markup meeting, 10-9-74, U
- 772 Milford quote from statement delivered before the Government Activities and Transportation Subcommittee of the House Committee on Government Operations, page 271, 11-29-77 Hg
- 773 Milford quote, Hg, 2-5-75, Wydler quote, *Ibid.*
- 773 Milford quote, Hg, 2-5-75; Wydler quote, *Ibid.*; Winn quote, 3-11-75, U
- 774 Wydler quote, *Ibid.*; Milford quote, 5-6-75, U
- 775 Milford quotes, *Ibid.*; Lloyd quote, 6-11-75, U; Wydler, and Goldwater quotes, *Ibid.*
- 777 Milford quote, Hg, 9-29-75; Wydler quote, *Ibid.*; Read to Milford, 9-3-75, CF; Lloyd quote, Hg, 11-4-75
- 779 "Future of Aviation" hearings, 5-4-76 through 5-20-76
- 780-1 Milford quote at Democratic caucus of committee, 1-26-77, U, Ambro, Milford and Fuqua quotes *Ibid.*
- 784 Milford to Carter, 2-14-77, CF; Crossfield to Schriever, 7-8-77, CF
- 785 Wydler to Adams, 8-4-77, CF, Harkin, Hg, 9-27-77, Lloyd, Milford and Wydler quotes, *Ibid.*
- 787-8 Milford testimony before House Government Operations subcommittee, *op. cit.*, Burton, Brooks, Goldwater, Harkin, Wydler, Walker quotes, *Ibid.*
- 789 Milford, Harkin and Wydler quotes, 3-7-78, U
- 790 "Future Needs and Opportunities in the Air Traffic Control System," committee print, 11-77, Milford to Teague, 10-4-77; Teague to Frosch, 10-13-77, CF
- 792 Milford bill, H.R. 8763, introduced 8-4-77
- 793 Brown and Milford quotes at full committee meeting, 8-8-78, U
- 797 Goldwater quote, 3-2-79, U, Harkin quote, CR, 3-28-79, Dornan, *Ibid.*
- 799 Goldwater quote, CR, 3-26-79, Harkin, letter to fellow-Congressmen, 5-11-79, CF, follow-up letter on 7-12-79, CF
- 806 Downing quote, 3-4-75, U, Myers, Mrs. Lloyd, Krueger quotes, *Ibid.*
- 807 Hechler quote, 3-5-75, U
- 807-8 Decisions reached at markup on 3-10-75, U
- 808 Seamans to Teague, 4-10-75, CF
- 809 Morton to Teague, 4-18-75, CF, Teague to Morton, 4-21-75, CF
- 810 Fuqua quote, 4-10-75, U, Hechler, Myers, Teague quotes, *Ibid.*
- 811 Hechler quotes, CR, 6-19-75, Emery quote, *Ibid.*

- Quotation or citation*
- Page*
- 815 Hechler to Seamans, 8-1-75, Seamans to Hechler, 9-9-75, CF
- 816 Teague, McCormack, Hechler quotes, Hg, 9-18-75
- 817 Seamans to Teague, 10-6-75, CF
- 818 Hechler and McCormack quotes, Hg, 10-30-75
- 819 Thornton quote, *Ibid.*
- 820 Bolling quote, CR, 12-11-75
- 821 Wright, Hechler, McCormack quotes, *Ibid.*
- 822 Bauman and Hechler quotes, *Ibid.*
- 823 Thornton, McCormack, Hays, Teague quotes, *Ibid.*
- 825 Ryan, Hechler, Teague quotes, *Ibid.*
- 827 Teague to all House Members, 2-17-76, CF, Teague quote, Hg, 3-31-76
- 828 Downing, McCormack, Wydler quotes, 4-27-76, U
- 829 Fuqua and Teague quotes, *Ibid.*
- 830 Teague to Ford, 6-8-76, CF; Teague to Carter, 8-11-76, CF
- 831 Carter to Teague, 9-4-76, CF, General Accounting Office Report opposing loan guarantees, 8-24-76, CF
- 832 Teague, Hughes, McCormack and McCormick quotes, Hg, 8-30-76
- 833 Teague to Albert, 9-1-76, CF
- 834 Albert to Teague, 9-1-76, CF
- 835 Lloyd-Hughes exchange, 8-30-76, Hg; Sisk and Anderson quotes, CR, 9-23-76
- 836 Mosher, Goldwater, Frey, Hechler and Teague quotes, *Ibid.*
- 837 Wright, Hayes and Madden quotes, *Ibid.*
- 838 Mathews, Int
- 839 Goldwater-Teague exchange, CR, 9-30-76
- 840 Richardson and Hechler quotes, Hg, 9-16-76
- 842 Fuqua quote, 4-20-77, U
- 843 Teague to O'Neill, 4-1-78, CF
- 844 Flowers, Int
- 846 Mosher and Gould to Teague, 3-9-78, CF; Goldwater and Ottinger quotes, 5-10-77, U; Teague and Ottinger exchange, 5-12-77, U
- 847-8 Wydler and Fuqua quotes, *Ibid.*; GAO letter to Teague, 5-9-77, CF; Ottinger quote, CR, 9-21-77
- 849-50 Flowers and Gage quotes, Hg, 2-9-78
- 850 Flowers quote on clean air standards, Hg, 4-26-78; Flowers statement on MHD, Hg, 5-2-78
- 851 Williams report on Cresap, W. Va., coal liquefaction facility quoted, CF
- 852 Quote from Williams report on Catlettsburg, Ky., H-coal Liquefaction Plant, CF
- 853 Myers quote, CR, 7-14-78
- 858 Teague, Flowers, Ottinger and Flippo quotes, 5-11-77, U
- 859 Ottinger, Flippo and McCormack quotes, *Ibid.*
- 862 Teague, Hall and Stone quotes from "European Oversight Trip," 6-77, Rpt; Flowers quote, Hg, 6-7-77
- 863 Wydler quote, *Ibid.*; Flowers and McCormack quotes, 6-14-77, U
- 865-6 Andelin, Int; McCormack to Carter, 7-1-77, CF; quote from The Energy Daily, 7-5-77, CF
- 867 Teague to Carter, 7-6-77, CF; Wydler and Downey quotes, CR, 9-13-77; Coughlin and Flowers quotes, *Ibid.*
- 868 Harkin, Ottinger, McCormack, Brown and Wydler quotes, *Ibid.*
- 871-2 President's veto message, 11-5-77; Teague statement on veto message, 11-5-77, CF
- 874 Presidential statement on signing supplemental appropriations bill, 3-7-78; Wydler quote, Hg, 1-25-78; Flowers and Mrs. Lloyd quotes, Hg, 2-2-78
- 875 McCormack quote, *Ibid.*
- 876 Teague, 3-14-78, U
- 877 Watkins and Teague quotes, *Ibid.*
- 878 Teague and Mrs. Lloyd quotes, 3-15-78, U; Schlesinger to Teague, 3-17-78, CF
- 879 Teague, Flowers and Wydler quotes, 3-21-78, U
- 880 Teague, Mrs. Lloyd, Goldwater, Flowers and Fuqua quotes, *Ibid.*
- 881 McCormack quote, *Ibid.*; Letter from Ottinger, et al., to Carter, 4-7-78, CF
- 883 Ketcham, Int; Teague, Int
- 884 Flowers, 4-11-78, U; McCormack, Lloyd, Mrs. Lloyd, Brown and Lujan quotes, *Ibid.*
- 885 Teague quote, *Ibid.*
- 886 McCormack, Flowers and Teague quotes, *Ibid.*
- 887 Teague letter to utility executives, 5-10-78, CF
- 888-9 Teague to Carter, 5-25-78, CF, Teague, follow-up letters to utility executives, 6-15 and 6-30-78, CF

Quotation or citation

- Page
- 889 O'Connor to Teague, 7-5-78, CF; Flowers, Brown, Wydler and McCormack quotes, CR, 7-14-78
- 891 Lloyd, Mrs. Lloyd, Teague, Harkin, Goldwater and Myers quotes, *Ibid.*
- 892 Fish quote, CR, 7-17-78; Carter to O'Neill, 4-24-79, CF
- 893 Brown quote, 4-26-79, U; Bouquard and Goldwater quotes, *Ibid.*
- 894 Wolpe, Roe and Ambro quotes, *Ibid.*; Quote from committee report, H. Rept. No. 96-196, Part 3, 5-15-79, Rpt
- 895 Harkin and Brown quotes, *Ibid.*
- 897 Flowers quote, CR, 7-14-78
- 898 Teague and Wydler letter to O'Leary, 6-13-78, CF
- 899 H. Rept. No. 96-196, Part 3, 5-15-79, pages 47-8, Glickman and McCormack quotes, 4-26-79, U
- 901-2 Glickman, Ottinger, Wolpe and Volkmer, "Additional Views," H. Rept. No. 96-196, Part 3, 511-2, Wydler quote in memo to Fuqua, 6-18-79, CF
- 904 McCormack, press release, 2-17-75, CF; McCormack quote, Hg, 2-18-75
- 905 McCormack quote, 3-5-78, U; Ottinger and McCormack remarks to Kane, Hg, 2-18-75; McCormack and Seamans exchange, Hg, 2-28-75
- 906-7 Ottinger, Goldwater and Ratchford quotes, 3-5-75 and 3-6-75, U; Hechler-Teem exchange, Hg, 7-16-75
- 908 Goldwater, Ottinger and Frey quotes, *Ibid.*; Goldwater-Ottinger exchange, 3-6-75, U
- 909 Goldwater and Winn quotes, CR, 6-19-75
- 910 McCormack to Seamans, 3-20-75, CF; McCormack and Goldwater to Seamans, 5-2-75, CF; Goldwater quote, Hg, 5-13-75; Mrs. Redford and McCormack quotes, Hg, 7-16-75
- 911 Mosher quote, Hg, 7-16-75
- 912 McCormack and Kane quotes, Hg, 6-3-75
- 913 Hechler-Brogan exchange, *Ibid.*; McCormack quote, CR, 9-5-75
- 914 Emery, Bauman, Goldwater and Kemp quotes, *Ibid.*
- 915 McCormack quote on conference report on electric vehicle bill, CR, 8-31-75; President's veto message, 9-13-75; McCormack, Int
- 915-6 Teague, Mosher, Goldwater and McCormack "Dear Colleague" letter, 9-14-75, CF
- 916 Teague and Goldwater comments on veto of electric vehicle bill, CR, 9-16-75
- 917 Wydler and Brown quotes, *Ibid.*
- 918 McCormack and Freeman quotes, Hg, 7-12-77
- 919 Ottinger, Thornton, Hechler quotes, Hg, 1-22-76; McCormack quote, CR, 5-19-76
- 920 McCormack, Goldwater, Ottinger and Frey remarks, *Ibid.*
- 922 Quote on Energy Extension Service from H. Rept. No. 94-294, 6-13-75; Seamans quote, Hg, 1-22-76
- 923 Thornton quote, Hg, 3-23-76; McCormack quote, *Ibid.* Goldwater and Hechler quotes, *Ibid.*
- 925 Brown comment during markup session on automotive R. & D. bill, 5-4-76, U; Goldwater quote, CR, 6-3-76
- 926 Goldwater quote, CR, 8-31-76
- 927 Brown letter to colleagues, 9-28-76, CF; Mosher, Brown and McCormack quotes, CR, 9-29-76
- 928 Ottinger quote, *Ibid.*; Brown quote, CR, 9-21-77
- 929 Brown quote, *Ibid.*
- 931 McCormack, Goldwater, Ottinger, and Gore quotes, CR, 9-13-77
- 932-3 McCormack and Goldwater quotes, CR, 2-8-78; McCormack statement in opening hearings, Hg, 4-11-78; Wydler statement on marking up solar photovoltaic bill, 6-6-78, U
- 933 McCormack presentation of solar photovoltaic bill in the House, CR, 6-28-78
- 934 Wylie and Ottinger quotes, *Ibid.*
- 935 Goldwater and Ottinger quotes, CR, 10-13-78
- 936 Frey quote, Hg, 1-25-78; Goldwater, Gore, Ottinger and Wirth quotes, *Ibid.*
- 936-7 Wydler quote, 3-14-78, U; McCormack, Gore and Frey quotes, *Ibid.*
- 938 Lujan quote, CR, 7-14-78
- 940 Symington quote, Hg, 5-24-73; Brown and Goldwater quotes, *Ibid.*
- 941 McCormack quote, Hg, 4-12-78; Winn quote, *Ibid.* Flippo quote, Hg, 4-13-78
- 942 Fuqua quote, Hg, 4-14-78; Wydler, Brown and Fuqua statements to full committee on solar satellite bill, 5-3-78, U
- 943 Ottinger and Fish remarks on SSPS, CR, 6-22-78
- 944 Ginter, Fuqua, Miller and Gore quotes, Hg, 2-8-78
- 945 Wolpe, Winn and Flippo quotes, 5-10-79, U
- 946 Ottinger, Gore and Blanchard quotes, 2-1-79, U
- 947 The vote on jurisdictions in Democratic committee caucus is recorded in the unpublished transcript, 2-1-79, U; Fuqua and Wydler quotes, Hg, 2-8-79
- 948 Ottinger, Gore, Blanchard and Wydler quotes, *Ibid.*

- Quotation or citation*
- Page
- 949-50 Ottinger quote, Hg, 6-14-79; Wydler quote, *Ibid.*
- 950 Gore, Fish, Ottinger, Wydler, Gibbons, Blanchard quotes, Hg, 6-21-79
- 952 Ottinger quote, Hg, 2-21-79; Walker quote in full committee markup, 3-21-79, 8, 9-79, U
- 953 Ottinger and Brown quotes, *Ibid.*; Mrs. Carter quote, Hg, 4-30-79
- 955 Brown quote in memorandum to Teague, 10-10-78, setting forth suggestions for the future of the Science Committee, CF
- 958 Report of Subcommittee on Environment and the Atmosphere, 3-25-75, U
- 959 Brown quote, CR, 6-19-75; Brown remarks in opening hearings on EPA authorization, Hg, 3-4-75
- 961 Jones quote, CR, 7-10-75
- 962 Brown-Fuqua colloquy, CR, 6-9-75
- 963 Esch quote, Hg, 7-8-75
- 964 Brown quote, Hg, 9-17-75
- 965 Brown quote on H.R. 35, Hg, 10-6-75; Brown quote on chronic exposure to low-level pollutants, Hg, 11-7-75
- 966 Quote from committee print on "Effects of Chronic Exposure to Low-Level Pollutants in the Environment," 11-75
- 967 Brown opposition to the Ketchum amendment, CR, 5-4-76
- 968 Winn quote, *Ibid.*; Brown quote, 7-22-76, U
- 969 Teague to Staggers, 8-30-76, CF
- 970 Byerly, Int; Brown quote, CR, 9-27-76
- 971 Evans quote, Hg, 6-15-76; Symms and Winn quotes, CR, 9-20-76
- 972 Brown quote, *Ibid.*
- 973 Brown appraisal of work of the Subcommittee on Environment and the Atmosphere, CR, 10-26-76
- 976 Brown quote, Hg, 2-2-77; Brown comments to full committee on Science Advisory Board, 3-30-77, U
- 977 Fuqua comments to House on EPA R. & D. bill, CR, 4-19-77; Winn comments on EPA, *Ibid.*
- 978 Quote on Brown's philosophy on environment and safety R. & D., Hg before House Public Works Appropriations Subcommittee, 4-6-77
- 979 Brown-Hollister exchange, Hg, 3-1-77; Brown statement on President's National Energy Plan, 6-7-77, CF
- 982 Breau to Teague, 4-7-77, CF
- 983 Spensley, Int
- 984 Brown, statement to roundtable on climate research, 3-22-77, CF; Brown to Teague, 4-4-77, CF; Winn comment to White, Hg, 4-5-77
- 985 Brown quote in remarks to subcommittee during markup of National Climate Program, 4-25-77, U
- 985-6 Brown remarks to House on climate program, CR, 9-9-77; Walker and Bauman comments on climate program, *Ibid.*
- 987-8 Brown to Kreps on climate program, 10-25-78, CF
- 989-90 Brown remarks in House on ocean pollution R. & D., CR, 2-28-78
- 992 Spensley, Int; Brown on EPA authorization in 1978, remarks to full committee, 3-14-78, U
- 993 Brown, remarks to House on EPA authorization in 1978, CR, 4-27-78; Rousselot quote, *Ibid.*
- 994 Brown to Teague, undated letter of transmittal for report on "The Status of Resource Recovery," August, 1978, Rpt
- 995 Brown to Teague, undated letter of transmittal for report on "Water Quality Research," January, 1978, Rpt, Suozzi quote, Hg, 4-8-78
- 997 Brown and Wirth quotes from publication of the proceedings entitled "National Conference on the Environment and Health Care Costs," 8-15-78, CF
- 998 McCormack, Brown and Fuqua quotes, as well as other developments are recorded in the transcript of the Democratic committee caucus, 2-1-79, U
- 999 Ottinger quote, *Ibid.*; Brown, Lloyd and Ambro quotes, *Ibid.*
- 1001 Ambro report to full committee on EPA R. & D. authorization, 3-15-79, U
- 1002 Ambro remarks on groundwater and anticipatory research amendments to appropriations bill, CR, 6-22-79
- 1007 Fuqua, Int; Fuqua, on Department of Energy authorization, CR, 7-26-79
- 1009 Fuqua, Int
- 1010 Fuqua quote in remarks to Frosch, Hg, 6-28-79

Selected Bibliography

1. DOCUMENTARY SOURCES

The voluminous files of the committee and its subcommittees constitute the major source to detail and interpret the events covered in this volume. In addition, each individual member maintained personal correspondence files, many of which were removed when members left the committee or left office. For example, some papers of the late Representative Overton Brooks, the first chairman of the committee, are deposited at Louisiana State University, Baton Rouge, La.

The papers of Representative George P. Miller, the second chairman of the committee, have been offered to St. Mary's College, Moraga, Calif. Texas A. & M. University is receiving the papers of the third chairman of the committee, Representative Olin E. Teague of Texas.

Since 1975, when the jurisdiction of the committee was greatly expanded, the most useful file is entitled the "Chairman's Reading File," which is maintained for the full committee and each of the subcommittees. The committee minutes are useful to record basic decisions, but include little of the debate which led up to them or their significance.

The unpublished stenographic transcripts of committee meetings and caucuses are very useful, especially for markup sessions. During the 1970's, these markup sessions, although public, were not published as a general rule. A great deal of revealing material is included in the unpublished transcripts of executive sessions which the committee frequently held during the 1960's.

As noted in the "Acknowledgments" (pages XXXI-XXXVI), a large number of personal interviews have been recorded, and these have both enlivened the history with anecdotal material and assisted in background interpretations of events.

2. COMMITTEE PUBLICATIONS

Important sources for the official actions of the committee are the printed hearings and reports. The reports include committee prints and House documents, as well as legislative reports. The latter cover analyses of each bill as it passes the committee prior to consideration by the House, plus the official decisions of conference committees, and the text of public laws which originate in the committee.

3. OTHER GOVERNMENT PUBLICATIONS

The Congressional Record is the central source for the stenographic record of the debate by the House of Representatives and the U.S. Senate, in addition to a potpourri of commentary, articles and editorials and other interpretive data supplied by Members each day the Congress is in session. Sometimes the key to unlock the secret of why certain actions were taken is contained in miscellaneous material inserted into either the body of the Record or Extensions of Remarks (formerly termed "Appendix").

The annual reports of the agencies with which this history deals, the official budget documents produced annually, the reports of the General Accounting Office, Office of Technology Assessment and Congressional Research Service are vital sources for an understanding of what happened and why. In recent years, the publications of the Congressional Budget Office have become increasingly important. Needless to say, the hearings and reports of the House and Senate committees, dealing with subject matter closely related to the work of the Science Committee, cannot be overlooked. This is particularly true of the actions of the House and Senate appropriations committees, and their conference reports, dealing with authorization legislation initially voted by the Science Committee and also dealing with related legislation.

Presidential statements, messages, texts of news conferences, addresses, and other official actions are contained in the "Weekly Compilation of Presidential Documents," and annually published by the National Archives and Records Service in "Public Papers of the Presidents of the United States." The "Federal Register" is the official source for executive orders, official regulations and other announcements.

4. DOCTORAL DISSERTATIONS

Two doctoral dissertations were particularly helpful in compiling this history: James R. Kerr, "Congressmen as Overseers: Surveillance of the Space Program," Stanford University, 1963; and Thomas P. Jahnige, "Congress and Space," Claremont Graduate School, 1965.

5. ARTICLES AND JOURNALS

For a running commentary on action in Congress and its committees, Congressional Quarterly and the National Journal were very useful, as well as magazines such as Science, Aeronautics and Space Technology, International Science and Technology, Daedalus, Chemical and Engineering News, Saturday Review, Nature, Bulletin of the Atomic Scientists and Physics Today. Among newspapers most frequently consulted were Washington Post, Wall Street Journal, Washington Evening and Sunday Star, The New York Times, Chicago Tribune, Louisville Courier-Journal, St. Louis Post-Dispatch and Los Angeles Times.

6. BOOKS

Adams, Sherman. *Firsthand Report: The Story of the Eisenhower Administration*. New York, N.Y.: Harper and Brothers, 1961.

Benson, Charles D., and Faherty, William Barnaby, *Moonport*. Washington, D.C.: National Aeronautics and Space Administration, 1978.

Bergaust, Erik, *Murder on Pad 34*. New York: G. P. Putnam's Sons, 1968.

Berkner, Lloyd V. *The Scientific Age: The Impact of Science on Society*. New Haven, Conn.: Yale University Press, 1964.

Boone, Adm. W. Fred. *NASA Office of Defense Affairs*. Washington, D.C.: National Aeronautics and Space Administration, 1970.

Brooks, Courtney G., Grimwood, James M. and Swenson, Loyd S., Jr. *Chariots for Apollo—A History of Manned Lunar Spacecraft*. Washington, D.C.: National Aeronautics and Space Administration, 1979.

Brooks, Harvey. *The Government of Science*. Cambridge, Mass.: The M.I.T. Press, 1968.

Byers, Bruce K. *Destination Moon: A History of the Lunar Orbiter Program*. Washington, D.C.: National Aeronautics and Space Administration, 1976.

Cochrane, Raymond C. *Measures for Progress—A History of the National Bureau of Standards*. Washington, D.C.: National Bureau of Standards, 1966.

Corliss, William R. *Histories of the Space Tracking and Data Acquisition Network, the Manned Space Flight Network, and the NASA Communications Network*. Washington, D.C.: National Aeronautics and Space Administration, 1974.

Eisenhower, Dwight D. *Waging Peace: 1956–1961*. Garden City, N.Y.: Doubleday & Co., Inc. 1965.

Emme, Eugene M. *A History of Space Flight*. New York, N.Y.: Holt, Rinehart and Winston, 1965.

Ezell, Edward Clinton and Neuman, Linda. *The Partnership—A History of the Apollo-Soyuz Test Project*. Washington, D.C.: National Aeronautics and Space Administration, 1978.

Gibney, Frank B., and Feldman, George J. *The Reluctant Space-Farers: The Political and Economic Consequences of America's Space Effort*. New York, N.Y.: New American Library, 1965.

Gilpen, Robert and Wright, Christopher, ed. *Scientists and National Policy Making*. New York, N.Y.: Columbia University Press, 1964.

Greenberg, Daniel S. *The Politics of Pure Science*. New York, N.Y.: New American Library, 1967.

Griffith, Alison. *The National Aeronautics and Space Act: A Study of the Development of Public Policy*. Washington, D.C.: Public Affairs Press, 1962.

Hacker, Barton C. and Grimwood, James M., *On the Shoulders of Titans: A History of Project Gemini*. Washington, D.C.: National Aeronautics and Space Administration, 1977.

Hall, R. Cargill. *Lunar Impact: A History of Project Ranger*. Washington, D.C.: National Aeronautics and Space Administration, 1977.

Hartman, Edwin P. *Adventures in Research—A History of Ames Research Center*. Washington, D.C.: National Aeronautics and Space Administration, 1970.

Holmes, Jay. *America on the Moon: The Enterprise of the Sixties*. Philadelphia, Pa.: J. B. Lippincott Co., 1962.

Hughes, Patrick. *A Century of Weather Service*. New York, N.Y.: Gordon and Breach, Science Publishers, Inc., 1970.

Johnson, Lyndon B. *The Vantage Point: Perspectives of the Presidency, 1963–1969*. New York, N.Y.: Popular Library, 1971.

Killian, James R., Jr. *Sputnik, Scientists, and Eisenhower*. Cambridge, Mass.: The M.I.T. Press, 1977.

Kistiakowsky, George B. *A Scientist at the White House*. Cambridge, Mass.: Harvard University Press, 1976.

Lambright, W. Henry. *Governing Science and Technology*. New York, N.Y.: Oxford University Press, 1976.

Logsdon, John M. *The Decision to Go to the Moon*. Chicago, Ill.: The University of Chicago Press, 1970.

Lomask, Milton. *A Minor Miracle—An Informal History of the National Science Foundation*. Washington, D.C.: The National Science Foundation, 1975.

McInnis, Mary, ed. *We Propose: A Modern Congress*. New York: McGraw-Hill Book Co.

Medaris, John B. *Countdown for Decision*. New York, N.Y.: G. P. Putnam's Sons, 1964.

Reedy, George. *The Twilight of the Presidency*. New York, N.Y.: World Publishing Co., 1970.

Rosenthal, Alfred. *Venture into Space: Early Years of the Goddard Space Flight Center*. Washington, D.C.: National Aeronautics and Space Administration, 1968.

Rosholt, Robert H. *An Administrative History of NASA, 1958-1963*. Washington, D.C.: National Aeronautics and Space Administration, 1966.

Shannon, James A., ed., *Science and the Evolution of Public Policy*. New York, N.Y.: The Rockefeller University Press, 1973.

Swenson, Loyd S., Jr., Grimwood, James M. and Alexander, Charles C. *This New Ocean--A History of Project Mercury*. Washington, D.C.: National Aeronautics and Space Administration, 1966.

Symington, James W. *The Stately Game*. New York, N.Y.: Macmillan, 1971.

Wenk, Edward, Jr. *The Politics of the Ocean*. Seattle, Wash.: University of Washington Press, 1972.

Wiesner, Jerome B. *Where Science and Politics Meet*. New York, N.Y.: McGraw-Hill Book Company, 1965.

Index

A

- Abelson, Philip H., 170, 624
 Abortion, 509-10
 Abzug, Representative Bella S., 286, 290-91, 297-9, 822
 Acupuncture, Representative George E. Brown, Jr. undergoes, 447
 Adams, Representative Brock (later Secretary of Transportation), 128 (photo), 142, 192, 448 (photo), 489, 785
 Adams, Sherman, 5
 Advanced Energy Technologies, Subcommittee on, 929-44
 Advanced Research and Technology, Subcommittee on, 142, 215-66 *passim*, 284
 Advanced Research Projects Agency, 6
 Advent, 214, 217
 Aerjet General Corp., 246
 Aeronautical and Space Sciences, Senate Committee on, 14, 20-22, 69-70, 102, 356-7, 609
 Aeronautical engineers, training of young, 749-53, 764
 Aeronautics, 249-55, 749-99
 Aeronautics and Space Technology, Subcommittee on, 347-55, 749-69
 Aerosar, 783-4
 Aerospace Safety Advisory Panel, 205
 AFL-CIO, 471-7, 480-1
 Africa, population and health issues in, 440
 Aging, House Select Committee on, 747
 Agnew, Vice President Spiro T., 269-70, 321
 Agricultural aircraft, 783
 Agricultural research, 41, 427, 435, 602
 Agriculture, Department of, 46, 240-1, 427, 491, 594, 596, 984
 Agriculture, House Committee on, 427, 595-6, 921
 Aircraft noise reduction, 250-5, 749-99, and the SST, 780
 Aircraft sales abroad, 784
 Air Force and "aerospace", 68, challenge to NASA, 77-8, 112; UFO investigations, 257-9
 Air pollution, 849-50, 963-4
 Air shows, Paris and Farnborough 397-98
 Air traffic control, 789-90
 Akins, James E., 672
 Alaska 356
 Albert, Representative Carl (Speaker of the House), 14, 15, 18, 127, 129, 142, 163, 195, 324, 337 (photo), 411, 528 (photo), 663, 698, 715, 834, 844
 Albright, Robert, 6
 Alexander, Holmes, Award, 60
 Allen, George V., 65
 Allen, John, 798 (photo)
 Allison, David, 144
 Allott, Senator Gordon, 649
 Ambartsumian, Dr. Viktor A., 385, 414
 Ambro, Representative Jerome A., 334, 337, 342, 425, 528, 583, 738, 781-2, 807, 894, 903, 930, 957, 974, 993, 995-6, 999-1003, 1000 (photo)
 American Association for the Advancement of Science, 614-7, 638, 640
 American Institute of Aeronautics and Astronautics, 322, 335, 409
 American Iron and Steel Institute, 469
 American Metric Journal, 475, 487
 American Physical Society, 624
 Ames Research Center, 752, 783
 Andelin, Dr. John, 664, 675, 845, 865-6
 Anders, William A., 206, 253-54, 752
 Anderson, Senator Clinton P., 256-7, 287-8
 Anderson, Jack, 432
 Anderson, Representative John B., 461, 463, 474, 555, 558, 835, 920, 927
 Anderson, Representative William R., 128 (photo), 142, 219
 Andolsek, Lud, 467 (photo)
 Andrews, Representative Mark, 597
 Anfuso, Representative Victor L., 28 (photo), 29, 32-3, 46, 81-2, 98-9, 103, 247, 369, 372-3, 379
 Antarctic Conservation Act of 1978, 375, 443, 527
 Anthony, Representative Beryl, Jr., 342, 855, 899, 945 (photo)
 Antigua, NASA tracking station at, 262
 Apollo, 74, 163-217 *passim*, 307, 414, 313-18
 Apollo applications, 208, 307
 Apollo-Soyuz, 410, 412-24
 Applications and Tracking and Data Acquisition, Subcommittee on, 99, 215, 259-60
 Applications Technology Satellites, 219, 245-6, 331, 337, 446
 Appropriate technology, 435-6, 953-6, 1006
 Appropriations, House Committee on, 24-6, 49-50, 176, 185-7, 260, 437-8, 496-7, 624, 685, 759, 776, 792, 808, 821, 852-3, 864, 917, 978, 1002, 1009
 Arends, Representative Leslie C., 7, 9, 13, 20-2, 133, 174
 Armed Services, House Committee on, 7, 8, 15, 17, 30-1, 34, 37, 40, 47, 96, 130, 432, 704, 719-23, 775, 853, 1007
 Armed Services Committee, Senate, Preparedness Investigating Subcommittee, 5
 Armstrong, Neil A., 163, 165 (photo), 262-3, 751 (photo), 752

- Army Ballistic Missile Agency, 4, 6, 68-9
 Ash, Roy L., 511, 678, 681-4, 765
 Ashbrook, Representative John M., 541-3, 546-8, 833
 Ashlev, Representative Thomas L., 843
 Aspen Institute, 434
 Aspin, Representative Les, 293
 Aspinall, Representative Wayne N., 153, 206, 317
 Astin, Dr. Allen V., 51, 451, 576
 Astronomy, radio, 215, 376-7
 ASTP (*See* Apollo-Soyuz)
 Atkinson, Dr. Richard C., 513 (photo), 523, 533, 539
 Atomic Energy Commission, U.S., 20, 510, 801, 805, 904
 Atomic Energy, Joint Committee on, 15, 141, 266, 510, 535, 655-6, 660, 704, 709-10, 718-9, 801, 806, 819, 820, 841, 865, 895-6, 899, 908
 ATS-6, 446
 Atwood, J. L., 197
 Auger, Prof. Pierre, 378
 Australia, metric system in, 478
 Automotive R. & D., 769-71, 778, 782, 797-9, 924-9
 Aviation (*See* Aeronautics)
 Aviation and Transportation Research and Development, Subcommittee on, 771-80
 Aviation Week and Space Technology, 35
- B**
- Badillo, Representative Herman, 299-300
 Baker, Bobby, 185
 Baldes, Dr. Edward J., 51
 Banking, Finance, and Urban Affairs, House Committee on, 829, 833, 848, 853
 Barnwell, S.C. Nuclear Fuel Plant, 865, 897, 900 (photo)
 Baron, Thomas R., 200-1
 Barrett, Representative William A., 679-80
 Baruch, Dr. Jordan J., 487-8
 Basic Research and National Goals, 140-1, 609-10
 Bass, Representative Perkins, 29, 33, 92-3, 98, 247
 Bates, Mrs. Dorothy M., 627, 635-6
 Bauer, Prof. Raymond A., 556
 Bauman, Representative Robert E., 522, 526, 528, 540, 648, 822, 914, 986
 Baumhart, Representative A. D., Jr., 29, 33
 Bay of Pigs, 81, 171
 Bean, Alan, 324 (photo)
 Beckler, David, 387 (photo), 616
 Bedford, Dr. Clay P., 58
 Beeman, Richard E., 184, 722
 Beilenson, Representative Anthony, 338, 431, 930, 974
 Bell, Representative Alphonzo, 98, 121, 126 (photo), 129, 142-3, 152-3, 169, 184, 206, 231, 256, 292, 308, 346, 399, 407, 409, 467, 471-5, 484, 501-12, 550-7, 584, 598-9, 611, 641, 714, 802, 811-5, 819, 903
 Bell, David, 247
 Bell Telephone Laboratories, 218
 Bennett, Dr. Ivan L., Jr., 58, 387 (photo)
- Bentsen, Senator Lloyd, 596
 Beresford, Spencer M., 9, 27 (photo), 34, 101, 375-6
 Bergland, Representative Bob (later Secretary of Agriculture), 306 (photo), 310, 325, 328-9, 671, 714, 769
 Bergman, Jules, 198
 Berry, Dr. Charles A., 72-3, 204
 Bevell, Representative Tom, 852
 Biaggi, Representative Mario, 153, 249, 276
 Biemiller, Andrew J., 471
 Bingham, Representative Johathan B., 718
 Biomass, 829-60
 Biomedical research, 980-1
 Bisplinghoff, Dr. Raymond L., 214-5, 220-1, 254, 502
 Blagonravov, A. A., 378
 Blanchard, Mrs. James J., 1003 (photo)
 Blanchard, Representative James J., 335, 337, 342, 425, 431, 829, 839, 855, 903, 930, 937, 946, 948, 951, 957, 1001, 1003 (photo)
 Bland, Richard E., 570
 Blatnik, Representative John, 657
 Blouin, Representative Michael T., 335, 430 (photo), 802, 806-7, 829, 909, 943, 960
 Boat trip, 714-16
 Boeing Co., 205, 235, 255, 272
 Bogan, Harney S., Jr., 9, 34
 Boggs, Representative Hale, 50, 293, 555
 Boland, Representative Edward P., 1002, 1009
 Bolling, Representative Richard, 18, 426, 555, 613, 699-714, 820
 Bond, Aleck C., 321 (photo)
 Bond, Langhorne, 785
 Boone, Adm. W. Fred, 261
 Boone, W. H., 101, 106-7, 397
 Borman, Frank, 201, 202 (photo), 203 (photo), 206, 747, 779, 1015
 Boron, Representative Fulton and, 248, 275
 Bouquard, Representative Marilyn Lloyd, 335, 337, 342, 448, 514, 522, 528, 747, 802, 806, 812, 841, 842 (photo), 848-9, 858, 860, 861 (photo), 863, 868, 873-4, 877-80, 884-6, 890-5, 897, 899, 930, 972
 Boushey, Brig. Gen. H. A., 10, 13
 Boyd, Alan S., 251
 Brademas, Representative John, 565, 745-6
 Brady, Dr. Edward L., 576
 Brand, Vance, 194
 Branscomb, Dr. Lewis M., 463-5, 566, 575-6
 Branscome, Darrell R., 342
 Breaux, Representative John B., 444 (photo), 540, 982
 "Breeder Briefs", 890
 Brennan, John J., 228
 Bridges, Jack, 672
 Brinkley, Representative Jack, 152, 248
 Brogan, Dr. John, 913
 Broglio, Prof. Luigi, 55, 381 (photo), 382
 Brookhaven National Laboratory, 939
 Brooks, Dr. Harvey, 126 (photo), 151
 Brooks, Representative Jack, 558-61, 787

- Brooks, Representative Overton, 3-18, 28 (photo), 29-61, 36 (photo), 61 (photo), 65-7, 77-8, 82-3, 87-9, 91, 123, 188, 247, 369, 372-5
- Brown, Representative Clarence J., 145
- Brown, Representative George E., Jr., 142, 152-3, 239, 252, 328, 340, 433-9, 442 (photo), 443-7, 475, 480, 532-3, 538, 543-51, 562, 574, 581-6, 592-601, 621-2, 636-40, 644-8, 691, 703, 721, 743, 744 (photo), 769-71, 803, 807, 820-2, 841, 849, 854 (photo), 860, 863, 867, 872, 877, 882-4, 889-90, 893-5, 911, 914, 920, 924-30, 942-8, 951-98, 956 (photo), 987, 1001
- Brown, George R., 187
- Brown, Dr. Harold, 150, 400, 563, 863
- Brown, Dr. Harrison S., 55, 57 (photo), 58, 383, 399-400
- Brucker, Wilber, 68
- Brussels Conference on Satellite Transmissions, 411-12
- Bureau of the Budget (*See also* Office of Management and Budget), 20, 196, 208, 276
- Bundy, McGeorge, 175, 610
- Bureau of Mines, 808-11, 856
- Bureau of Standards, National, 14, 17, 46, 48, 51, 100, 104, 124, 451, 452, 457, 461, 468-9, 473 (photo), 474, 477, 566-70, 567 (photo), 575-9, 667, 939
- Burke, Adm. Arleigh A., 181
- Burton, Representative John L., 787-8
- Burton, Representative Phillip, 708, 833
- Byerly, Dr. Radford, Jr., 957, 969-70, 984, 994
- C**
- Cabell, Representative Earle, 152-3, 184, 206, 283, 292 (photo), 404, 405, 501, 557-8, 560, 750
- Calio, Dr. Anthony J., 359
- Cameron, Jean, 27 (photo)
- Camp, Representative John N. Happy, 283, 292, 298, 308-10, 325, 328, 409, 422, 475, 509, 714
- Canada
metric system in, 478
visit of Canadians, 157, 389-92
visit to Canada, 392-3
- Cannon, Representative Clarence, 26, 50
- Cannon, Dr. Helen Christy, 356
- Cannon, James M., 628
- Carey, William D., 387 (photo), 614, 619
- Carney, Representative William, 342, 740, 855 (photo)
- Carpenter, M. Scott, 124
- Carpenter, Richard, 498 (photo)
- Carstarphen, John A., Jr., 34, 101, 467
- Carter, President Jimmy, 340-1, 434, 650 (photo), 651-3, 830-1, 855, 862, 864-7, 870-82, 887-92, 924, 929, 983, 987 (photo), 1007
- Carter, Luther J., 239
- Carter, Mrs. Rosalynn, 953, 954 (photo)
- Casey, Representative Bob, 98, 129, 142, 169, 192, 208, 231, 282-3, 361 (photo), 362
- Cassidy, Dan, 352
- Catlettsburg, Ky., H-coal liquefaction facility at, 800 (photo), 851-2
- Centaur, 115-6, 214
- Central Intelligence Agency, 10
- Cernan, Gene, 420
- Cerro Tololo Inter-American Observatory, 387
- Chaffee, Roger, 193-4, 204
- Chance Vought Corp., 64
- Chemical and Engineering News, 565
- Chenoweth, Representative J. Edgar, 29, 33, 70 (photo), 85, 86, 92, 98-9, 129, 211 (photo), 212, 214, 454
- CHESS (Community health and environmental surveillance system), 737
- China, People's Republic of, 429, 440, 447
- Christensen, H. C., 406
- Chrysler Corp., 272
- Church, Senator Frank, 864
- Civil Aviation Research and Development (CARD) study, 754-5
- Clarke, Arthur, 41
- Clean air standards, 849-50, 963-4
- Cleland, Max, 744 (photo)
- Clement, David D., 991
- Clements, John G., 743, 748
- Cleveland, Representative James A., 183
- Climate program, national, 972, 983-4
- Clinch River Breeder Reactor (CRBR), 812, 848, 855-98, 928-9
- Coal gasification and liquefaction, 801-56
- Coal pipeline, 840
- Coal R. & D.
and NASA, 685
energy, 801-56
- Coal Research, Office of, 805, 808-11, 851
- Coast Guard, 813-4, 964
- Coblentz, William, 27 (photo)
- Cohn, Nathan, 465
- Coleman, William T., Jr., 779
- Collins, Michael, 163
- Colmer, Representative William, 50, 555
- Commerce, Department of, 457, 459, 461, 463, 469, 477, 596, 792, 987-8
- Committee on Science and Astronautics, House
(*See* Science and Astronautics, House Committee on)
- Committee on Science and Technology, House.
(*See* Science and Technology, House Committee on)
- Commonwealth Edison Co., 890
- Communications Satellites, 88, 99, 215, 217-220, 329, 376-7, 446
- Community health and environmental surveillance system (CHESS), 737
- Community impacts of synthetic fuels, 818
- Comptroller General (*See* General Accounting Office)
- Computers and the Learning Society, 440
- Conable, Representative Barber B., Jr., 142-3, 216, 219, 224, 226, 236, 238, 462
- Congressional Research Service, Library of Congress
(*See also* Legislative Reference Service, and various divisions by name), 402, 445, 446, 580, 629, 667, 964, 966, 973, 980

Conlan, Representative John B., 310, 334, 347, 425, 475, 485, 507, 515, 517 (photo), 518-25, 671, 714, 762, 771, 839, 903, 972

Connolly, Senator John J. (Canada), 157, 391

Conrad, Charles, 310

Conservation, 673, 829, 905-39

Conyers, Representative John, Jr., 434

Construction of Facilities, 117-21, 851-2, 954

Corliss, William R., 371

Corman, Representative James C., 98

Corps of Engineers, U.S. Army, and land at Cape Canaveral, Fla., 112-14

Cortright, Dr. Edgar M., 249 (photo), 332, 752

Cotter, Representative William R., 283, 294, 310, 345, 347, 399, 407, 507, 714, 762, 765

Coughlin, Representative R. Lawrence, 283, 292, 325, 354, 501, 662, 812, 867, 870

Council of Europe, 386-7, 406, 429

Council on Environmental Quality, U.S., 402, 958, 978

Cox, William M., 488-9

Crane, Dr. Langdon, 429

Crane, Representative Philip M., 492-3, 496-7

Cresap, W. Va., coal liquefaction facility at, 851-2

Criminal justice, comparative, 433-4

Critical Issues Council, 179-81

Cronin, Representative Paul W., 310, 507, 623, 671, 700, 714, 767

Crossfield, A. Scott, 784

Culver, Representative and Senator John C., 703

Curien, Prof. Hubert, 445

Curtis, Senator Carl T., 649

D

Daddario, Representative Emilio Q., 28 (photo), 29, 55, 58, 64-5, 72, 95, 114, 121-2, 126 (photo), 128 (photo), 129-61, 148 (photo), 383, 388, 391, 429, 455 (photo), 498 (photo), 499-500, 549-53, 560, 561 (photo), 577, 607-8, 626

Dannenberg, K. K., 70 (photo)

David, Dr. Edward E., Jr., 399, 403, 407, 614-5, 635, 663, 915

Davis, Dr. George K., 435

Davis, Representative John W., 70 (photo), 98, 106, 129, 134, 219, 248, 347, 381 (photo), 466-75, 467 (photo), 501-13, 552-9, 565-71, 577, 580, 588, 598, 613, 621, 657-62, 666, 700, 704, 762

Davis, Maj. Gen. Leighton, 112

Davis, Representative Mendel J., 325, 399, 407

Davis, Representative Robert W., 342, 543, 855

Day, Melvin S., 353

Debus, Dr. Kurt H., 112, 161, 168 (photo), 169

De Grauw, Senator J., (the Netherlands), 406

Deschler, Lewis, 686

De Simone, Daniel V., 463-64

Deep Seabed Mineral Resources Act, 433

Dellums, Representative Ronald V., 346

De la Garza, Representative E., 593-6

Del Riego, Joseph, 184, 409, 665, 687, 755

Democratic Study Group, 557, 837

Dent, Frederick B., 473

Department of Science, 621, 624, 630, 633-9, 648

Derwinski, Representative Edward J., 461

Dillaway, Dr. Robert B., 734-7

Dingell, Representative John D., 708, 720, 823, 825, 847, 1007-8

DISPA (subcommittee), 398, 424-9

DISPAC (subcommittee), 398-9, 430-41, 745

DNA and genetic engineering, 586-92

Dobrynin, Ambassador A. F., 409, 416, 417

Dodd, Representative Christopher J., 335, 484, 514, 829, 868, 903

Domestic and International Scientific Planning, Analysis and Cooperation (DISPAC), Subcommittee on, 398-9, 430-41, 745

Domestic and International Scientific Planning and Analysis (DISPA), Subcommittee on, 424-9

Donnelly, John P., 360

Donnelly, Warren H., 665

Doolittle, Dr. James H., 10

Dornan, Representative Robert K., 301, 337, 342, 532, 537, 585, 747, 795, 798 (photo), 841, 855, 861, 930, 934

Dornberger, Dr. Walter S., 10, 13

Douglas, Donald W., 41

Douglas, James H., 181

Downey, Representative Thomas J., 337, 493, 841, 859, 864, 867, 882, 943

Downing, Representative Thomas N., 98, 129, 142, 152-3, 211 (photo), 212, 219, 223, 248, 270, 275-6, 290, 309-10, 322-6, 324 (photo), 348, 802, 806, 812, 815, 828

Downs, Hugh, 748

Drinan, Representative Robert F., 968

Dryden, Dr. Hugh L., 10, 11, 12 (photo), 47, 75-6, 79, 83, 92, 232, 374-7

DuBridge, Dr. Lee A., 10, 52, 57 (photo), 135, 158, 270, 622

Ducander, Charles F., 3, 28 (photo), 29, 31, 34, 37-9, 46, 61, 100-1, 104, 118, 141, 183-4, 404-5, 660-1, 732, 762

Dugan, Dr. John V., Jr., 764, 782, 845, 849, 862

Duke Power Co., 881

Dulles, Allen W., 10

Duncan, Representative John J., 860, 861 (photo), 878

Dupree, Dr. A. Hunter, 58

Dyer, Col. Harold F., 70 (photo)

E

Eagleton, Senator Thomas F., 289

Earth Resources Information System, 339-40

Earth Resources Technology Satellite, 219, 239-40, 327, 329, 337, 405

Earthquake Research and Engineering, 584-6

Earth Sciences, Special House Subcommittee on, 45-6

Eberle, Hal, 511

Echo Communications Satellite, 12 (photo)

Eckhardt, Representative Bob, 152, 244, 248, 267 (photo)

Edgar, Representative Robert W., 988

Edison Electric Institute, 881

Education, Department of, 547-8

- Education, Office of, 477, 547-8
 Education, science, 129, 139, 151, 242-5, 505-49
 Education and Public Welfare Division, Congressional Research Service, Library of Congress, 151
 Eggers, Dr. Alfred, 505
 Ehlers, Dr. Vernon, 624
 Ehrlicke, Kraft, 10, 940
 Eisenhower, President Dwight D., 4, 19, 21, 23, 28 (photo), 65, 69, 73, 146, 171, 594, 605, 621
 Eisenhower, Dr. Milton, 180
 Electric vehicles, 911-18
 Electronics Research Center, 171, 181, 188, 219-31
 Ellender, Senator Allen J., 290
 Elliott, Representative Carl, 130-1
 Emery, Representative David F., 334, 479, 484, 514, 641, 802, 811, 829, 914, 957
 Energy, International Cooperation in, 428
 Energy, Ad Hoc Committee on, 720, 843
 Energy Daily, The, 866-7
 Energy, Department of, 799, 843-56, 873-902, 930-54, 1003, 1007
 Energy Development and Applications, Subcommittee on, 855-6, 949-54, 1003
 Energy Extension Service, 919, 921-4, 948, 951
 Energy Research and Production, Subcommittee on, 899 ff.
 Energy Research, Development and Demonstration, Subcommittee on, 428, 717, 903-29
 Energy Research, Development and Demonstration (Fossil Fuels), Subcommittee on, 801-40
 ERDA (Energy Research and Development Administration), 801-56, 904-34
 Energy subcommittees, one or two?, 715-6
 Energy subcommittee jurisdictions, 715-6, 802-5, 841, 845-6, 946-7
 Energy, Subcommittee on, 669-93, 702, 940
 Energy, task force on, 656-69
 "Energy News Notes," 672
 Engineers, National Society of Professional, and metric system, 462
 Environment and the Atmosphere, Subcommittee on, 804, 957-98
 Environment and safety, energy aspects of, 804-8, 958, 977-80
 Environmental Policy Division, Congressional Research Service, Library of Congress, 402, 664-5
 Environmental Protection Agency
 Clean air standards, 849-50
 Community health and environmental surveillance system (CHESS), 737
 Noise, aircraft, 765
 Research priorities, 966-7
 (see also 958-1003)
 Environmental quality, 154-5
 Environmental Quality, U.S. Council on, 402, 958, 978
 Environmental research centers, 965
 ERDA (Energy Research and Development Administration), 770
 Errel, Representative Allen E., 342, 447, 497, 543, 599, 600, 855-6, 1000 (photo)
 Ervin, Senator Sam, 509, 615
 Esch, Representative Marvin L., 283, 328, 330, 334, 345, 310, 311, 470-1, 501, 507, 512, 514, 517 (photo), 558, 560, 562, 571, 644, 665, 671, 714, 903, 925, 957, 963
 European Space Agency, 343, 429
 European oversight trip, 1977-440-1, 1979-448
 European Space Research and Technology Centre, 412
 Evans, Representative Frank E., 824, 971
 Evans, L. J., 281
 Explorer I, 6, 68
- ## F
- Fager, Maxime A., 112
 Falco, Mathea, 449 (photo)
 Falkie, Dr. Thomas, 808-11
 Farley, Clare F., 355
 Farnborough Air Show, 397-8
 Fast Flux Test Facility, 902 (photo)
 Federal Aviation Administration (FAA), 749-99 (passim)
 Federal Council on Science and Technology, 427
 Feldman, Ambassador George J., 9, 10, 12 (photo), 20, 22, 27 (photo), 33, 40, 368 (photo), 369
 Finan, William, 20
 Findley, Representative Paul, 380-1
 Finger, Harold, 205
 Finnegan, David B., 803-4
 Finney, John W., 370
 Fiorio, Dr. Franco, 381 (photo), 385, 403
 Fire (Apollo), 193-206
 Fire Research and Safety, 150, 565-75
 Fish, Representative Hamilton, Jr., 337, 342, 727 (photo), 796 (photo), 841, 855, 858, 863, 868, 882, 892, 896, 930, 934, 938, 943, 951
 Fisk, James B., 135, 498 (photo)
 Fletcher, Dr. James C., 277-83, 287-8, 294-6, 322, 340, 348-50, 363 (photo), 364, 417-22, 736, 742, 759-61, 766
 Flippo, Representative Ronnie G., 337, 342, 532, 545, 573-6, 740, 858, 899, 930, 940-5, 1009 (photo)
 Florence, Italy, 1975 Conference, 429
 Flowers, Representative Walter, 283, 292 (photo), 309-10, 334, 507, 512-14, 536-40, 644, 669-70, 714, 718-9, 802, 815, 840-56, 842 (photo), 855-98, 861 (photo), 877 (photo), 930
 Foley, Representative Thomas S., 593-4, 968
 Food and Drug Administration, 600
 Ford, Representative, Vice President and President Gerald R., Jr., 7, 9, 12 (photo), 24-5, 33, 49-50, 68, 146, 159, 166, 277-9, 293, 454, 485, 605-8, 623-6, 625 (photo), 631-2, 639-41, 644-5, 647 (photo), 648-50, 654, 700, 814-7, 823, 830, 855, 908, 915, 926
 Ford, Senator Wendell H., 645-6
 Foreign Affairs, House Committee on, 436-9, 446-7
 Foreign Affairs Division, Congressional Research Service, Library of Congress, 155, 386
 Foreign Relations Authorization Act, 436-37
 Forsythe, Representative Edwin B., 337, 342, 431, 443, 532, 841, 885 (photo), 899, 974, 989, 1001

- Fossil fuels R. & D., 801-56
 Fossil and Nuclear Energy, Subcommittee on, 841-56
 Fossil Fuels Subcommittee, 717, 801-56
 Fourth Parliamentary and Scientific Conference, 429
 Frank, Karl H., 355
 Fraser, Representative Don, 557
 Frederickson, Dr. Donald, 981
 Freeman, S. David, 897, 918
 Frey, Representative Louis, Jr., 153, 265, 276-8, 283, 237-9, 292, 300, 308-10, 311 (photo), 334, 337, 407-9, 484, 501, 641, 648, 714, 731, 829, 836, 841, 846, 849, 903, 908-10, 936-7
 Fri, Dr. Robert W., 816-7
 Frosch, Dr. Robert A., 202, 301, 304-5, 340, 445, 748, 790, 1010
 Frutkin, Arnold W., 380, 397, 399, 415
 Fulbright, Senator J. William, 89
 Fuller, Buckminster, 748
 Fullerton, Charles G., 301 (photo)
 Fulton, Representative James G., 7-8, 11, 12 (photo), 27-8, (photos), 29, 32, 40, 44, 53, 62 (photo), 63, 67, 70 (photo), 80-2, 107, 158-9, 169-72, 182-4, 197, 205, 240, 244, 256, 272-3, 279-82, 286, 314, 368 (photo), 371 (photo), 372, 382, 404, 415, 451-63, 455 (photo), 577, 606 (photo), 722, 730-2
 Fulton, Representative Richard H., 129, 218, 261, 656, 703
 Fuqua, Mrs. Don, 1008 (photo)
 Fuqua, Representative Don, 127, 129, 152-5, 174, 190, 195, 206, 231, 275-6, 286-99, 292 (photo), 303-4, 311 (photo), 312, 316, 333-41, 335 (photo), 358-61, 366 (photo), 404-5, 420, 430 (photo), 436-40, 441 (photo), 445-8, 467 (photo), 470-97 (metric system), 508, 600, 641-8, 654, 727 (photo), 781, 829, 842, 846-7, 860, 877, 880, 890-4, 927, 934, 940-7, 953, 962, 977, 997-9, 1000 (photo), 1005-11, 1008 (photo), 1009 (photo)
 Furnas, Dr. Clifford C., 51, 57 (photo)
- G**
- Gagarin, Maj. Yuri Alekseyevich, 80-83, 91, 170-1
 Gage, Stephen J., 849
 Gallo, Theresa, 723
 Galloway, Mrs. Eilene, 130
 Gammage, Representative Bob, 337, 841, 938
 Gardner, Richard N., 215
 Gardner, Trevor, 4
 Garriott, Owen K., 324 (photo)
 Gasohol, 939, 948
 Gates, Dr. David M., 58
 Gavin, Gen. James M., 4, 10, 13, 75, 135
 Gavin, Joseph G., 321 (photo)
 Gemini, 179, 184-5, 191, 193
 General Accounting Office, 67, 149, 435, 469-70, 494, 525, 527, 736, 828, 831-2, 847-8, 873-4, 878, 883, 918
 General aviation, 756, 764, 767
 General Electric Co., 216, 254, 362, 758
 General Services Administration, 746, 913
 Geographic distribution, 139-40, 185-9, 512-3, 516, 536-40, 545
 Geothermal energy, 676, 689-92, 846-8, 904-47, 954
 Geothermal Energy Research, Development, and Demonstration Act of 1974, 689-92, 911
 Gibbons, Dr. John H., 565, 951
 Gibbons, Representative Sam M., 477
 Gibney, Frank B., 25
 Gilman, Representative Benjamin A., 449 (photo)
 Gilpatric, Roswell, 112
 Gilruth, Dr. Robert R., 79, 107, 167, 197, 209 (photo)
 Ginter, R. D., 943
 Glaser, Dr. Peter, 940
 Glenn, astronaut, Senator John, 73, 107-8, 170, 316
 Glennan, Dr. T. Keith, 11, 36 (photo), 39, 51, 64, 65, 66, 67, 74, 181, 185-6, 294
 Glickman, Representative Dan, 337, 342, 431, 438, 546, 791-2, 791, 794 (photo), 795, 855, 868, 882, 901, 930, 937, 953
 Goddard, Robert H., 317
 Goland, Martin, 51, 52, 57 (photo)
 Goldman, Dr. Marshall I., 410
 Goldwater, Senator Barry, 645, 749
 Goldwater, Representative Barry M., Jr., 153, 255, 283, 308-10, 325, 337, 342, 345, 347, 407, 448, 474, 484, 497, 501, 509, 569, 584, 605, 614, 619, 671, 675, 691, 714, 723, 736, 749-99 *passim*, 807, 815-6, 829, 836, 841, 863, 867, 872, 880, 891, 893, 899 (photo), 903, 906 (photo), 907-8, 910, 912, 914-5, 923-8, 931-2, 933 (photo), 934-6, 940, 967, 976-7
 Goodling, Representative William F., 571
 Gore, Representative Albert, Jr., 300, 338, 342, 358 (photo), 359, 431, 740, 851, 855, 930-1, 936-7, 944, 946, 948-51
 Gorman, Harry H., 70 (photo)
 Gortlieb, Dr. Mel, 898
 Gould, Col. Harold A., 102, 118-20, 119 (photo), 223-4, 388, 440, 676, 728, 734-7, 810, 845-6, 1010-12
 Government and science, 134-5, 137, 499-601
 Government Operations, House Committee on, 612, 641, 652, 673, 733, 737, 786-8, 803, 842
 Gray, Edward Z., 355-7, 743
 Green, Representative Edith, 523
 Green, Representative William J., 152, 184, 206
 Greenwood, J. W. ('Ward'), 390
 Griffin, Senator Robert P., 928
 Grissom, Virgil ('Gus'), 63, 185, 193-4, 197, 204
 Grosart, Senator Allister (Canada), 392-3
 Gross, Dorothy K., 496
 Gross, Representative H. R., 124, 201, 205, 278, 454, 469, 474, 482, 501, 565, 767
 Groundwater R. & D., 995-6, 1002
 Grumman Aerospace Corp., 272
 Guayule, 592-7
 Gude, Representative Gilbert, 822
 Gunter, Representative Bill, 310, 409, 419, 420, 671, 714
 Gurney, Representative Edward J., 129, 141, 152, 169, 171, 184, 206-7, 220, 225, 228, 231, 243, 296
- H**
- H-coal, 800 (photo)
 Hackerman, Dr. Norman, 444 (photo), 515
 Hackes, Peter, 570

- Haideimonakis, Dr. Epimenides, 401
 Hause, Fred W. Jr., 301 (photo)
 Haley, Representative James A., 688, 821
 Hall, Representative David M., 29, 212
 Hall, Representative Durward, 145, 454
 Hall, Dr. John A., 861-2
 Hall, Kirk, 665, 673
 Hall, Representative Tim L., 335, 514, 771, 829, 839
 Halleck, Representative Charles A., 32, 171
 "Ham" (chimpanzee), 79, 80, 81 (photo), 84
 Hammill, Frank R. Jr., 37, 101, 189, 219, 232, 257, 273-4, 397, 406, 409, 684, 792, 804
 Hance, Representative Kent, 342, 447, 543, 855 (photo)
 Handicapped, programs for, 545, 741-8
 Handler, Dr. Philip, 59, 161, 162, 382-3, 386-7 (photo), 407, 502, 620, 1014
 Hanna, Representative Richard T., 283, 291-2, 310, 399, 408-11, 501, 507, 665, 669, 671, 674 (photo), 714
 Hannigan, Thomas, 477, 481, 486
 Hansen, Senator Clifford P., 649
 Hansen, Representative Julia B., 708-14, 730-2
 Hansen Committee, 708-14, 730-2
 Harkin, Representative Tom, 334, 337, 342, 438, 440, 443, 444 (photo), 480, 514, 524, 532-43, 546, 548, 771, 781, 785, 788-9, 794 (photo), 839, 841, 858-9, 861, 863, 868, 882, 891, 895, 903, 909-10, 912, 918, 930, 974, 976, 998
 Harlow, Bryce, 21
 Harper, Charles W., 249-50
 Harris, Representative Oren, 15, 18, 44, 99, 130
 Haughton, D. J., 281
 Haworth, Dr. Leland, 137-9, 144-5, 151, 156-7, 161
 Hayes, Representative Philip H., 334, 802, 807-8, 829, 837, 903, 957, 971-2, 983
 Hays, Representative Brooks, 7, 22, 586
 Hays, Representative Wayne L., 708, 821-3
 Hayward, Rear Adm. John T., 10
 Health, Education, and Welfare, Department of, 741
 Health, National Institutes of, 130, 510, 571, 590-1
 Health care costs, national conference on, 996-7
 Hébert, Representative F. Edward, 188
 Hechler, Representative Ken, 28 (photo), 29, 70 (photo), 202 (photo), 215-28, 233, 249 (photo), 250-4, 260-2, 318-9, 348-55, 376-7, 416, 452, 462-6, 474, 509, 606-7, 613, 621, 641, 691, 696, 713-7, 722, 730-2, 749-69, 751 (photo), 774, 801-40, 905-7, 912-3, 920
 Heinlein, Robert, 748
 Heiss, Dr. Klaus P., 940
 Heldenfels, Dr. Richard, 467 (photo)
 Helios, 399
 Helium, 911
 Helms, Senator Jesse A., 649
 Helstoski, Representative Henry, 153, 249
 Henderson, Representative David B., 558
 Hesse, Dr. Walter J., 58
 Highways, Federal Administrator of, and Metric System, 488-9
 Hilburn, Earl D., 231
 Hines, Richard P., 9, 27 (photo), 34, 101, 387
 Hines, William, 90, 200
 Hinton, Lloyd, 779, 786
 Holifield, Representative Clet, 612, 656, 660, 672, 691, 709, 812
 Hollenbeck, Representative Harold C., 337, 342, 438, 440, 441 (photo), 532, 537-8, 540, 543-4, 546, 573-6, 581-3, 587-8, 593-5, 599, 600, 727 (photo), 747, 841, 861, 899, 993
 Hollister, Hal., 979
 Hollomon, Dr. J. Herbert, 459
 Holmes, D. Brainerd, 98, 109-10, 166
 Holmfeld, Dr. John D., 426, 427, 429, 467, 699
 Hopkins, Robert A., 475 (photo), 487
 Horner, Richard E., 63
 Hornig, Dr. Donald F., 251, 253, 387 (photo), 403, 498 (photo), 622-3
 Hoskins, Alexis J., 992
 Hosmer, Representative Craig, 461
 Hotz, Robert, 35
 Houbolt, John, 110
 House Administration, Committee on, 725-6, 728-9
 Housing and Urban Development, Department of, 675, 746
 Houston, location of NASA Center at, 185-7
 Houston Chronicle, 417
 Huddle, Franklin P., 627, 636
 Hughes Aircraft Co., 218, 235-7, 245
 Hughes, Phillip S., 832, 835
 Human rights, and Soviet scientists, 438-9
 Humble Oil Co. and location of NASA Center in Houston, 187
 Humphrey, Vice President and Senator Hubert H., 147-9, 148 (photo)
 Humphreys, Dr. Lloyd G., 502
 Hunt, Representative John E., 152, 205, 248, 267 (photo)
 Hydrogen, 766, 911, 939
- I
- Ichord, Representative Richard H., 462
 Impoundment, 506-9
 India and ATS-6, 245, 331, 337, 446
 Indian Affairs, Bureau of, 596
 Information Agency, U.S., 218
 Innovation and productivity, 599-601
 Inspector General for NASA, 182
 Institute for Scientific and Technological Cooperation, 446-7, 1006
 Intelsat Conference, Nairobi, 440
 Intergovernmental Science Policy, 601
 Interior, Department of the, 240-1, 803, 809, 813, 843, 850-1
 Interior and Insular Affairs, House Committee on, 686-8, 704, 813-4, 821, 853, 890, 1007
 Internal combustion engine. (See Automotive R. & D.)
 Internal Revenue Service, 537
 International biological program, 155-7
 International Atomic Energy Agency, 861
 International Conference on the Human Environment, 402
 International Cooperation and Security, Subcommittee on, 46, 395

International Cooperation in Science and Space,
 Subcommittee on 395-9, 424
 International Council of Scientific Unions, 402
 International Disabled Expo, 744
 International Geophysical Year, 4
 International Environmental Science, Joint Colloquium on, 402

International Relations, House Committee on, *See*
 Foreign Affairs, House Committee on
 International science, 145-7, 155, 367-449
 International Science and Technology magazine, 144
 International Science and Technology Transfer Act
 of 1974, 411
 International space activities, 445-6
 International Subcommittee, 404, 405, 407
 Interstate and Foreign Commerce, House Committee
 on, 15, 18, 44, 99, 130, 704, 720-1, 783, 829, 833,
 890, 968-70, 1007

Investigations and Oversight, Subcommittee on,
 73-41

ISIS (Individualized Science Instructional System),
 525

J

Jackson, Senator Henry M., 155, 686, 823, 848
 Jackson, Lady Barbara Ward, 384 s, (photo), 455
 (photo)

Jackson, Roy P., 752, 763

Japan, committee trip to, 409, 410

Jarman, Representative John, 334, 425, 633, 925

Javits, Senator Jacob K., 16

Jeffords, Representative James M., 919-20

Jenks, Gerald E., 1008 (photo)

Jensen, Representative Ben, 167-8

Jet Propulsion Laboratory, 231-6, 333, 770, 924

Jodrell Bank, 260

Johannesburg tracking station, 345-50

Johnson, Representative Harold T., 747

Johnson, Representative James P., 825, 977

Johnson, Representative Luther, 164

Johnson, Lyndon B., Space Center (Houston), 422
See also individual projects, names of astronauts
 and officials.

Johnson, Senator, Vice President, and President
 Lyndon B., 5-6, 8, 16-7, 22-5, 30, 46, 49, 61
 (photo), 74-5, 86-7, 125 (photo), 127, 140, 196

Johnson, Roy, 6

Johnson, Vincent, 330

Joint Commission on Soviet-American Research, 428
 Joint Committee on Aeronautics and Outer Space,
 14-17

Joint Committee on the Organization of Congress,
 183, 696, 722

Joint U.S.-U.S.S.R. Missions, 174-6, 379 (*See also*
 Apollo-Soyuz)

Jmas, Representative Charles, 187

Jones, Representative Robert E., 961

Jordan, Senator B. Everett, 559

Judd, Representative Walter, 25

Judiciary Committee, House, 470

Judiciary Committee, House, Subcommittee on
 Crime, 434

Jupiter, 352

Jurisdiction, committee, 14, 15, 18, 41-6, 99, 432,
 434, 694

Justice, Department of, 434, 470

K

Kane, James S., 905, 912

Karsh, Representative Joseph E., 29, 70 (photo),
 81, 84, 103, 114-7, 177, 210 (photo), 211 (photo),
 211-48, 261-9, 266 (photo), 273-86, 314, 320-3,
 321 (photo), 397, 404, 698-9, 730

Keating, Representative and Senator Kenneth B.,
 7, 12 (photo), 22, 24-6, 63, 133

Keldysh, M. V., 208, 412, 414

Keller, Kent T., 10

Kelley, Dr. Albert, 222-4

Kemp, Representative Jack F., 914

Kennan, George F., 402

Kennedy, Senator Edward M., 146, 529-32, 559,
 561 (photo), 562, 598, 618-9, 627-8, 642-3, 645

Kennedy, President John F., 23, 61 (photo), 63,
 74, 77-8, 82, 87, 91-3, 94 (photo), 122, 127, 174-6,
 224-5, 242, 247, 378-9, 412, 605

Kerr, Dr. James R., 96, 374, 379, 762

Kerr, Senator Robert S., 61 (photo), 74-5, 185

Kerwin, Joseph, 310

Ketcham, Robert C., 448, 704, 802, 842 (photo),
 845, 882

Ketchum, Representative William M., 335 (photo),
 514, 671, 700, 714, 967

Khrushchev, 32

Kilday, Representative Paul, 14

Killian, Dr. James R., 4, 23, 64, 69, 374, 498 (photo),
 616, 620-1

King, Representative David S., 28 (photo), 29, 79,
 81, 85, 98, 247

Kipling, Rudyard, 149

Kistiakowsky, Dr. George B., 54-5, 134, 140, 498
 (photo), 622-3

Kitt Peak National Observatory, 162 (photo)

Kluczynski, Representative John, 424

Knoppers, Dr. Antonie T., 126 (photo)

Knox, William, 610-1

Knutson, Martin A., 311 (photo)

Koch, Representative Edward I., 153, 248, 257,
 274, 279

"Koreagate," 408

Kosygin, Soviet Premier A. N., 389, 407

Kovacs, William, 969-70

Kraft, Christopher C., Jr., 415

Kramer, Representative Ken, 342, 855

Kramer, Dr. Thomas R., 444 (photo), 585

Kratchman, Jack, 699, 702

Kratzer, Myron B., 399

Kreps, Juanita, 987

Krueger, Representative Robert (Bob), 335, 337,
 514, 532, 743, 802, 806-7, 813, 829, 841, 903, 930

Kuykendall, Representative Dan H., 712

L

Laboratories, Federal, utilization of, 157, 597-8, 849, 946

Lamontagne, Maurice, 391

Lance, Bert, 652

Landsat, 337, 344, 446

Lanes, Stephen J., 899 (photo), 1000 (photo)

Langley Research Center, 110, 235, 325, 342, 433, 467, 676, 752, 773-4, 783

Lausanne Conference (1972), 406

Law of the Sea Conference, 432-3

Laxalt, Senator Paul D., 529, 645

Lederberg, Dr. Joshua, 527, 588

Lee, Capt. Chester M., 419, 420, 422

Leggett, Representative Robert L., 973, 982

Legislative Counsel, Office of, House, 636

Legislative Reference Service, Library of Congress (*see also* Congressional Reference Service), 104, 136, 455-6

Legislative Reorganization Act:
Of 1946, 1
Of 1970, 552, 606-7

Lenher, Samuel, 136

Leonov, A. A. (cosmonaut), 327 (photo), 410, 423 (photo)

Lewis Research Center, 116, 676, 752, 758, 773-4, 925

Life sciences, 72-3

Lindbergh, Charles A., 160, 549, 608

Lindsey, Sam, 312-3

Line-iteming, 806-10

Liter, spelling of, 487-8

Lloyd, Representative Jim, 300, 301 (photo), 334, 337, 342, 437-8, 477, 479, 483-4, 514, 574, 738-41, 739 (photo), 747, 771, 775-8, 781-2, 791, 795, 835, 839, 841, 884, 891, 903, 999

Lloyd, Representative Marilyn. (*See* Bouquard, Representative Marilyn Lloyd)

Loan guarantees. (*See* Synthetic fuels)

Lockheed Missile & Space Co., 272

Loflin, Leslie, 432

Long, Dr. Franklin A., 158, 161

Longenecker, Dr. Herbert E., 58

Los Angeles Times, 232, 423

Lousma, Jack R., 324 (photo)

Lovell, Sir Bernard, 55, 378

Lovell, James A., Jr., 206, 319 (photo)

Low, Dr. George M., 78-80, 348, 353, 362, 412, 413 (photo), 414-6, 420-1, 750

Low-level pollutants, chronic exposure to, 965-6

Lowenstein, Representative Allard, 394-5

Lucas, Dr. William R., 1008-9 (photos)

Lueddecke, Maj. Gen. Alvin R., 234

Lujan, Manuel, Jr., 337, 342, 740, 841, 849, 863, 880, 884, 899, 938, 1000 (photo)

Lukens, Representative D. E. (Buz), 152-3, 244, 248, 501

Lunar Orbiter, 235

Lundin, Dr. Bruce T., 230, 752

Lundine, Representative Stanley N., 342, 899, 901 (photo), 1001

Lunik, 29, 46, 65

Lynch, Timothy B., 957

M

MACOS "Man, a Course of Study", 513, 518-20, 649

Madden, Representative Ray J., 472, 833-4, 837

Magnetohydrodynamics (MHD), 413, 804-5, 811, 850-1

Magnuson, Senator Warren G., 402, 570, 642

Magruder, William, 611

Madden-Monroney Joint Committee, 183, 696-7, 722

Mahon, Representative George, 50

Major or nonmajor committee, 697-9, 707

Malck, Frederick, 511

Malone, Dr. Thomas F., 52, 402

Malthus, Sir Thomas, 427

Manned Orbiting Laboratory. (*See* MOL)

Manned Space Flight, Subcommittee on, 169-94 *passim*, 270-9, 415, 420

Mansfield, Senator Mike, 290

Mansfield amendment, 500, 609-10

Marceau, Dr. Ian W., 1001

Mariner, 237-9, 352

Mark, Dr. Hans, 752

Mars, 253-8, 256, 269-70, 278, 314, 331-3

Marshall Space Flight Center, 28 (photo), 70 (photo), 116, 676

Martin, Representative Dave, 461, 472, 700, 702

Martin, Representative James G., 310, 507-8, 542-3, 623, 671, 714

Martin, Representative (former Speaker of the House) Joseph W. Jr., 2, 7, 9, 19, 27 (photo), 29, 32, 38, 70 (photo), 76, 91, 98, 129, 142, 173, 182-3, 226

Martin Marietta Corp., 272

Materials Policy, 579-84

Mathews, Charles W., 329-30, 339

Mathews, Nancy, 838

Matsunaga, Representative and Senator Spark M., 472, 483

Mathews, Representative B. B. "Billy", 296

Matthews, W. R. "Dede", 743, 747

Mattingly, Thomas K., 315

Maurer, George, 1

Mavroules, Representative Nicholas, 342, 795, 855, 899, 901 (photo)

Maxwell, Paul C., 446, 582

McCabe, Edward A., 21

McCarthy, Senator Eugene, 114

McClory, Representative Robert, 450 (photo), 455, 461, 468, 472, 477, 558

McCloskey, Representative Paul N., 433

McClure, Senator James A., 649, 892

McCollister, Representative John Y., 474

McCormack, Representative and Speaker of the House, John W., 1-33 *passim*, 12 (photo), 27 (photo), 37-8, 60, 71, 91, 127, 142, 224, 228, 337 (photo), 354-5, 633, 698

- McCormack, Representative Mike, 310, 367, 409, 437, 440, 471-9, 492, 497, 501-2, 507, 529-36, 542, 591, 621, 624, 630, 635-40, 644, 648, 655-93, 664 (photo), 674 (photo), 700-2, 715-9, 736, 769, 801-56 *passim*, 859-92, 877 (photo), 900 (photo), 903-54, 906 (photo), 957, 998
- McCormick, Dr. William, Jr., 687, 832
- McCullough, Dr. James M., 589
- McDade, Representative Joseph M., 808
- McDivitt, James A., 233 (photo), 236
- McDonald, Representative Lawrence P., 468
- McDonough, Representative Gordon L., 7, 12 (photo), 22, 24-5, 27 (photo), 29, 32, 49-50, 73
- McDonnell, James S. Sr., 62 (photo)
- McDonnell Aircraft Corp., McDonnell Douglas Corp., 66, 254, 272, 342, 798 (photo)
- McElroy, Dr. William D., 502, 505, 698
- McGovern, Senator George S., 289, 598-9
- McIntyre, James T., 582, 652
- McKee, Gen. William F., 251
- McLucas, John, 779
- McNamara, J. P., 298
- McNamara, Robert S., 113, 247
- McNaught Syndicate, 60
- McNeil, Wilfred J., 136, 498 (photo)
- Medaris, Maj. Gen. John B., 10, 69
- Melcher, Representative and Senator John, 833
- Merchant, Livingston T., 65
- Merchant Marine and Fisheries, House Committee on, 44-5, 96, 433, 704, 792, 964-5, 972-3, 981-3, 988-9, 1003
- Mercury (project), 63-4, 73-4, 79, 88-9, 107-8, 179
- Metcalf, Representative and Senator Lee, 7, 12 (photo), 22, 27 (photo), 560
- Meter, spelling of, 487-8
- Methanol, 813, 911
- Metric Association, U.S., 488
- Metric Board, U.S., 485-97
- Metric Conversion Act of 1975, 252, 451-97
- Metric Council, American National, 485-6, 491
- Metric Journal, American, 475, 487
- Metric System, 451-97
- Mexico, committee trip to, 438, 740-1
- MHD (*see* magnetohydrodynamics)
- Michaelis, Michael, 136, 498 (photo)
- Microwave landing system (MLS), 784-9
- Milford, Representative Dale, 310, 328, 334, 337, 349, 409, 425, 431, 493 (photo), 528, 671, 714, 767, 771-94, 772 (photo), 810, 841, 861, 957, 990
- Miller, Bennett, 944
- Miller, Representative George P., 29, 32, 44-6, 56-9, 57 (photo), 61, 67, 77, 79, 81, 92, 94 (photo), 125 (photo), 95, 126, 173-4, 184, 213, 226, 247, 257, 260-1, 269-86 *passim*, 314-8, 346, 371 (photo), 376, 383, 384 (photo), 386-7 (photo), 396, 403-6, 412-7, 450-466 (metric system), 498 (photo), 501, 505, 507 (photo), 549-60, 566-9, 577, 598-9, 657-62, 667-8, 696-9, 730-2, 751 (photo)
- Miller, René H., 55
- Mills, Representative Wilbur D., 31, 698
- Mills, William, 366 (photo)
- Mink, Representative Patsy T., 825, 833
- Minority staff, 101, 172, 182-5, 722-9
- Mitchell, Edgar, 315
- Mitchell, Representative Erwin, 29, 46, 121
- Mogavero, Louis N., 358
- Moeller, Representative Walter H., 28 (photo), 29, 89, 98, 142, 219
- MOL (Manned Orbiting Laboratory), 192, 208
- Mondale, Senator and Vice President Walter F., 198, 287
- Monroney-Madden Joint Committee, 183, 696-7, 722
- Moon program (*see* Apollo)
- Moore, Frank B., 865, 987
- Moran, Joseph, 27 (photo)
- Morris, Representative Thomas G., 98, 106, 114, 129, 134, 164, 210, 211 (photo), 212, 222
- Morton, Rogers C. B., 809
- Moscow, committee trip to, 409
- Mosher, Representative Charles A., 88-9, 92-3, 103-5, 125 (photo), 129, 134-8, 145-6, 152-4, 179, 207, 222, 228, 236-7, 238, 240-1, 273-7, 282, 285-6, 292-3, 298, 407-8, 421, 429, 441 (photo), 450 (photo), 453, 455 (photo), 465-85 (metric system), 498 (photo), 500-1, 507 (photo), 510-60 *passim*, 561 (photo), 590-1, 585, 605-54, 647 (photo), 662, 664, (photo), 679, 691, 704, 723-5, 727 (photo), 728, 736, 758, 762-3, 810, 814-5, 830, 836, 845-6, 912, 915, 925-7
- Moss, Senator Frank E., 642, 645, 647 (photo)
- Moss, Thomas H., 957
- Mortley, John, 483
- Moudy, Dr. James M., 523-5
- Mueller, George E., 166-7, 178, 188-92, 199, 241, 282
- Murphy, Audie, 194
- Murphy, Representative John M., 433, 719, 814, 981, 990
- Murphy, Representative Morgan F., 283, 322, 325, 407, 415
- Myers, Representative Gary A., 334, 337, 425, 484, 519-20, 641, 802, 806-7, 810, 812-13, 819, 829, 841, 846, 849, 860, 861 (photo), 863, 867, 881, 890-1, 930, 957, 972
- Myers, Boyd C., 230, 298
- Myers, Dale D., 197-8, 256, 272, 281, 298, 309, 420, 721, 880-1
- Myers, Representative John T., 915
- Myron, Mary, 27 (photo)

N

- Nader, Ralph, 709
- Nairobi, Intelsat Conference, 440
- Natcher, Representative William H., 6-7, 12 (photo), 13, 22, 27 (photo)
- National Academy of Engineering, 617, 619, 663
- National Academy of Sciences, 134, 138, 140-1, 143-5, 150, 161, 190, 239, 386, 407, 592-4, 616-7, 620, 638, 640, 663, 972, 976
- National Advisory Committee for Aeronautics, 10-11, 18, 20, 345, 752, 767

- National Aeronautics and Space Administration (NASA), establishment of, 19-21, 24-6, 39-50, 63-93, 95-124, 163-206, 211-63, 269-303, 307-60, 682-5, 745-99, 962 (*see also* headings of separate programs and names of NASA officials)
- National Aeronautics and Space Council, 13-14, 23, 80-3, 190, 253-5, 751-2
- National Bureau of Standards (*see* Bureau of Standards, National)
- National Council on the Handicapped, 745
- National Federation of Independent Businessmen, 483
- National Institute of Justice, 434
- National Institutes of Health (*see* Health)
- National Journal, 161
- National Oceanic and Atmospheric Administration (NOAA), 782, 792, 957, 964, 972, 985, 988-91
- National Science Board, 59, 611
- National Science Foundation (NSF), 14, 18, 46, 51, 53, 129, 137-9, 143-7, 375-6, 400, 411, 427, 436, 438-9, 443, 499-549, 596, 601, 609-10, 619, 649, 652, 682-5, 911
- National Space Club, 54, 414
- Native Latex Commercialization Act (*see* Guayule)
- Natural gas and oil extraction, 807
- Natural Resources and Environment, Subcommittee on, 998-1003
- Natural Resources Defense Council, 979
- Natural Resources Policy Division, Congressional Research Service (*see also* Environmental Policy Division), 994-5
- Naugle, Dr. John E., 240
- Neal, Representative Stephen L., 337, 431, 867, 930
- Neel, Dr. James, 542
- Nelson, Representative Bill, 342, 343 (photo), 740, 855
- Nerva, 255
- Netherlands, 412
- Neubert, Erich, 70 (photo)
- New Delhi, India, forum on appropriate technology, 436
- New technological opportunities, 611
- New York Times, The, 3, 5, 86, 223, 370
- Newell, Dr. Homer E., 117, 224, 236-7
- Nicks, Oran W., 232
- Nimbus, 216
- NIRAS (National Institutes of Research and Advanced Studies), 610
- Nixon, President Richard M., 122, 230, 288, 407, 423, 425, 562, 605, 611, 615, 616, 620, 621, 676-7, 756, 855
- Noise, aircraft (*see* aircraft noise reduction)
- Norstad, Gen. Lauris, 181
- North American Aviation; North American Rockwell Corp.; Rockwell International, 66, 185-7, 193, 196-8, 200-1, 207, 272, 289, 294-5, 362
- Northrop Corp., 233
- Nova, 108-12
- Noyes, Prof. Albert N., 51, 57 (photo)
- Nuclear
- Energy, Wadler reports on Soviet development in, 441-2
 - Power in space (*see* Nerva)
 - R. & D., 855-902, jurisdiction, 717-8
 - Safety, 977-8 (*see also* Three Mile Island)
 - Theft, 432
- Nutrition, 435, 602
- O
- Oak Ridge, Tenn
- Committee trip to, 860
 - President Carter's trip to, 887
- Oak Ridge breeder experimental test reactor, 881, 885-6
- Oak Ridge National Laboratory, 666, 692, 812, 852
- O'Brien, Lawrence F., 175
- Occidental Petroleum Corp., 825
- Oceanography, jurisdiction over, 44-6, 96
- Oceans, pollution of, 964-5, 981-3, 988-90, 1003
- O'Connor, Frank, 176
- Oceans and International and Scientific Affairs, Bureau of, 437
- O'Brien, Representative Leo W., 7, 12 (photo)
- O'Donnell, Kenneth, 83
- OECD, 387 (photo), 388, 403, 406
- Office of Defense Mobilization, 4
- Office of Management and Budget, 284, 292, 297, 332, 502, 504, 510, 511, 540, 582, 617, 619, 627, 651-2, 678, 681-4, 757, 765, 770, 827, 905, 976, 981, 984, 987-8
- Office of Science and Technology Policy, 339, 376, 428, 436, 438, 535-6, 636-7, 641, 643, 649-54, 989, 1010
- O'Hagan, Malcolm, 491
- Oil shale, 692, 801-56
- O'Leary, John F., 859, 898, 985
- Oliver, Dr. Clarence P., 51, 58
- O'Neill, Representative and Speaker of the House, Thomas P., Jr., 18, 228, 337 (photo); 433, 595, 642, 672, 843-5, 853, 872, 892, 981-2
- OPEC, technology transfer to, countries, 428, 438, 447
- Organization of Congress, Joint Committee on the, 183, 696, 722
- Organization, Study and Review, Democratic Committee on, 708, 730-1
- Orleans, Leo A., 429, 435
- Osmer, Representative Frank C., Jr., 29, 33
- Ottinger, Representative Richard L., 334, 337, 342, 462, 519, 536, 590, 738, 771, 781, 820, 823, 828-60 *passim*, 854 (photo), 858-9, 861 (photo), 899, 903, 910, 912-13, 916-20, 928, 931, 934-6, 942-3, 946-54, 957, 963, 999
- Outer Continental Shelf, exploration for oil and gas on, 813-4
- Outer Space Treaty of 1967, 379-80, 445
- Outer Space, U.N. Committee on Peaceful Uses of, 370, 380, 388-9, 395, 445-6

Oversight, Subcommittee on NASA, 142, 190, 195-205, 235-7, 281, 389, 405, 733
 Oversight, Subcommittee on Special Studies, Investigations, and 733-7
 Overton, Senator John H., 30
 Overton, Judge Winston, 30
 Owen, Thomas B., 399
 Ozone layer, depletion of, 960-3

P

Paine, Dr. Thomas O., 163, 206-9, 230, 253-5, 281
 Paley commission, 579
 Panel on Science and Technology, 50-9, 57 (photo), 105, 130-2, 134, 136-7, 141-2, 155, 382-5, 405, 452, 556, 612, 613-1, 712
 Paris Air Show, 397-8, 448
 Parker, B. B., 881
 Parliamentarian of the House, 434, 686, 698, 709
 Parris, Representative Stanford E., 310, 347, 471, 475, 507, 508, 671, 714, 762, 767
 Pasternak, Dr. Alan, 897
 Patent Policy, 22, 23, 114-6, 491-2, 602
 Patents and Scientific Inventions, House Subcommittee on, 46, 99, 121-3
 Patman, Representative Wright, 50, 570
 Patrick Air Force Base, machine shop at, 113
 Patten, Representative Edward J., 62 (photo), 129, 134, 169, 231
 Peacock, Col. Earl G., 70 (photo), 102, 118-9
 Pease, Representative Donald J., 342, 446, 543, 546, 547 (photo), 945
 Peck, Charles, 579
 Peer Review, 523-4
 Pegasus, 185
 Pell, Senator Claiborne, 458, 460, 466, 468, 485
 Pelly, Representative Thomas M., 98, 129, 142, 152-3, 171, 174-5, 177, 195, 205, 218, 225-8, 248, 252-5, 265, 267 (photo), 271, 276, 283, 292, 345-6, 412, 413 (photo), 462, 555, 558, 749
 Pepper, Representative Claude, 472, 747
 Perkins, Representative Carl D., 693, 821
 Peterson, Kenneth T., 469, 477
 Peterson, Russell W., 564-5
 Petrone, Maj., Col. and Dr. Rocco, 114, 168, 174, 201, 335 (photo), 362, 523
 Petrov, Boris N., 410
 Pettersen, Dr. Sverre, 51-2, 58
 Pettis, Representative Jerry L., 152-3, 244, 248, 256, 259, 267 (photo), 461, 501, 566
 Phénix Breeder Reactor, 448, 861
 Phillips, Gen. Samuel C., 197-9
 Pickering, Dr. William H., 69, 231, 266 (photo), 770
 Pickle, Representative J. J., 310, 347, 468, 470-1, 484, 507, 508, 621, 671, 693 (photo), 700, 714, 762
 Piel, Gerard, 523
 Pioneer, 344, 352
 Pittsburgh Research Center, 813, 851
 Poage, Representative W. R., 593
 Podell, Representative Bertram L., 153, 206
 Polaris, 68
 Polk, Dr. Louis F., 451, 494-5
 Pollack, Herman, 387 (photo), 389, 392, 399
 Pounds, Dr. William F., 58
 Porter, Dr. Roger, 58
 Portillo, President Lopez, 741
 Post Office and Civil Service, House Committee on, 641
 Pou, Representative Edward, 75-6
 Powers, John A. "Shorty", 80
 Pownall, Thomas G., 281
 "Practical Values of Space Exploration" (*see also* spinoffs from space program), 173, 263-5
 Pratt & Whitney Aircraft Division, United Aircraft, 294
 President's Science Advisory Committee, 4
 Press, Dr. Frank, 339-41, 428, 438, 535-6, 650 (photo), 651-4, 948, 984, 1010
 Pressler, Representative, and Senator Larry, 334, 802, 812, 829, 839-40
 Price, Don K., 136, 155, 621-2
 Price, Representative Mel, 432, 672, 719-20, 819, 908
 Price, Mrs. Robert, 361 (photo)
 Price, Representative Robert, 153, 276, 283, 292, 308-9, 322, 325, 361 (photo), 407, 415-6, 758
 Priestman, J. D., 406
 Princeton Plasma Physics Laboratory, 898
 Prospector, 116
 Proxmire, Senator William, 287, 360, 696, 833
 Public Administration, National Academy of, 549
 Public affairs program (NASA), 360-5
 Public Works and Transportation, House Committee on, 440, 596, 704, 738, 747, 774, 781, 929, 961
 Puckett, Allen E., 281
 Pursell, Representative Carl D., 337, 431, 493 (photo), 858, 868, 896, 898, 930, 934

Q

QUESTOL (quiet engine short takeoff plane), 760-4
 Quie, Representative Albert H., 455, 699
 Quigley, Representative James M., 28 (photo), 29
 Quillen, Representative James H., 482

R

Randall, Clarence E., 5
 Randall, Representative William J., 98, 129, 211 (photo), 212, 247, 267 (photo)
 R. & D. (research and development), Hearings on Federal, 130-1, 426-7
 Rangel, Representative Charles B., 283, 306 (photo), 309, 345-8
 Ranger Oversight Subcommittee, 214, 231-4
 Rarick, Representative John R., 472
 Ratchford, Dr. J. Thomas, 366 (photo), 392, 498 (photo), 612, 657-93 *passim*, 664 (photo), 906 (photo)
 Ratzenberger, James, 527
 Ray, Dixy Lee, 677, 682
 Rayburn, Representative, and Speaker of the House, Sam., 1, 5-7, 14, 16, 24-6, 34, 60, 142, 372, 697
 RCA, 233
 Read, Ralph N., 430 (photo), 772 (photo), 773, 777
 Reagan, Ronald, 650
 Redford, Mrs. Robert (Lola), 910
 Reedy, George, 549
 Relav, 219

- Republican Members (*see* names of Members; *see also* minority staff)
- Research Applied to National Needs (RANN), 500, 502-5, 508-12, 611
- Research Management Advisory Panel, 105, 135-6, 154, 317, 498 (photo), 602, 609-10, 668, 677
- Resource recovery, 968-9, 994-5
- Resources for the Future, 802
- Reuss, Representative Henry S., 673, 674 (photo)
- Revelle, Dr. Roger, 51, 57 (photo), 59, 135, 145, 155-6, 383
- Review Board, Fire (NASA), 184-6
- Rhodes, Representative John J., 50, 624
- Rice University, and location of NASA Center in Houston, 187
- Richardson, Elliot L., 485, 840
- Richmond, Representative Frederick W., 909
- Rickover, Adm. Hyman G., 10, 13, 867
- Richman, Representative R. Walter, 28 (photo), 29, 33, 38, 70 (photo), 71, 98, 103, 105-6, 110, 128 (photo), 129, 134, 136-8, 169, 231
- Ringer, Ms. Barbara, 412
- Ritchie-Calder, Lord, 469
- Ritter, Representative Donald Lawrence, 342, 447, 497, 543, 546, 547 (photo), 583, 855, 1001
- Roberson, Floyd I., 748
- Roberts, Dr. Richard W., 468-9, 477, 576
- Roche, John P., 469
- Rockefeller, Laurance S., 155
- Rockefeller, Vice President Nelson A., 627-33, 632 (photo), 643, 647 (photo)
- Rocketdyne Division (*see* North American)
- Rockwell International (*see* North American)
- Rodman, Dr. John, 550-1
- Roe, Representative Robert A., 283, 310, 334, 337, 342, 399, 407, 409, 411, 424-5, 475, 596, 671, 714, 771, 781-2, 829, 841, 855, 885 (photo), 894, 899, 946
- Rogers, Representative Paul G., 571, 591, 962., 996-7
- Rogers, William P. (Secretary of State), 385
- Rome, American Club of, 402
- Roncallo, Representative Angelo, 510
- Roodzant, Sherman, 742-6
- Rooney, Representative Fred B., 968
- Roosa, Stuart, 315
- Roosevelt, Representative James, 452-53, 455
- Rose, Representative Charles, 917
- Rose, James A., Jr., 184
- Rosen, Milton W., 109
- Ross, Miles, 493 (photo)
- Roth, Representative Toby, 342, 740, 899, 900 (photo)
- Roudebush, Representative Richard L., 70 (photo), 98, 109, 119 (photo), 129, 142, 152-3, 169-71, 183-4, 205-6, 225, 228, 231, 242-4, 271, 276, 393 (photo), 394-5, 500-1
- Roush, Representative J. Edward, 28 (photo), 29, 63, 98, 128 (photo), 129, 134, 142-3, 152, 185, 188-9, 218, 221, 230, 248, 252, 257-62, 386, 462, 577
- Rousselot, Representative John H., 542, 927, 993
- Royer, Representative Bill, 342, 358 (photo)
- Rubel, John H., 113, 261
- Rudd, Representative Eldon, 337, 492-3, (photo), 535, 537-8, 540, 782-3, 930
- Rules, House Committee on, 8, 18, 99, 130, 151, 174, 454, 458-60, 471-2, 481-2, 553-7, 566, 592, 595, 641, 686, 697, 711, 819, 833-6, 923, 969
- Rumsfeld, Representative Donald, 129, 142, 152, 171, 183-4, 192, 199, 205-6, 220, 225, 227, 243, 260, 462, 696, 723
- Rushworth, Maj. Robert A., 124
- Rusk, Dean (Secretary of State), 155, 371 (photo), 382
- Russell, Prof. Richard J., 52-3, 57 (photo)
- Ryan, Representative Leo J., 825
- Ryan, Representative William Fitts, 98, 122, 139, 142, 152, 169, 197-8, 205, 208, 218-21, 243, 248, 267 (photo)
- S**
- Sabato, Dr. Jorge A., 384
- Sagan, Dr. Carl, 258-9
- Sr. Paul Pioneer Press, 284
- Salter, Dr. Lewis S., 515
- Safire, William, 562
- Salk, Dr. Jonas, 546
- Salyut, 414
- Santini, Representative Jim, 583-4
- Sarbanes, Representative and Senator Paul S., 712
- Satellite Transmissions, Brussels Conference on, 411-2
- Sawhill, John C., 511, 624
- Scherer, Lee R., 493 (photo)
- Scherle, Representative William, Jr., 795
- Scheuer, Representative James H., 334, 337, 342, 425, 430 (photo)-41, 449 (photo), 480, 514, 528, 540, 543, 590, 745, 771, 775, 781, 829, 841, 861, 934, 957
- Schirmer, Katherine P., 872
- Schirra, Walter M., Jr., 192, 203 (photo), 218,
- Schisler, Representative Gale, 128 (photo), 142, 184, 192
- Schlesinger, Dr. James R., 846-7, 871, 874-9, 882, 889, 936, 947-8
- Schmitt, Dr. and Senator Harrison H., 316, 689-90, 744 (photo)
- Schoessow, Prof. Glen J., 1008 (photo)
- Schriever, Gen. Bernard A., 10, 113, 165, 784
- Schultze, Charles L., 696
- Schwartz, Mrs. Patricia, 756
- Schweickart, Mrs. Clare W., 523
- Schweickart, Russell L., 206
- Science and Astronautics, House Committee on
- Authorization, 14
 - Establishment of, 18-19
 - Jurisdiction, 14
 - See* other headings for activities
- Science, Research and Development, Subcommittee on 127-61, 451-70, 499-505
- Science and Technology, House Committee on:
- Expansion of authority, 695-748
 - Naming of, 704-5
 - See* other headings for activities
- Science and Technology, U.N. Conference on, 439

- Science, Department of. *See* Department of Science
 Science for citizens program, 529-36
 Science magazine, 140, 170, 239, 529, 624, 1016
 Science Policy, National, 607-9
 Science Policy Research Division, Congressional
 Research Service, Library of Congress, 104, 136-7,
 144, 151, 155, 157, 160, 386, 426, 446, 577,
 580, 588-92, 597, 607, 611, 616, 635, 802, 946
 Science, Research and Technology, Subcommittee
 on, 427, 436, 439, 476-97 (metric system), 499-
 633
 Science, Technology, and Diplomacy Act of 1978,
 436
 Scientific information, dissemination of, 610-11
 Scientific Research and Development, Subcommittee
 on, 46, 99, 119
 Scientific Training and Facilities, Subcommittee
 on, 46
 Scientists and engineers, training and employment
 of, 13, 129, 242-5, 280, 598-9, 611
 Scott, David R., 206
 Scoville, Anthony, 438, 581
 Seamans, Dr. Robert C., Jr., 57 (photo), 76, 79,
 83-7, 190, 217, 221, 225, 264, 619-20, 703, 805,
 815-7, 827, 905, 910, 919, 922
 Sedov, Leonid I., 374
 Seiberling, John F., Jr., 283, 322, 325, 501, 558,
 662, 693 (photo), 757
 Seitz, Dr. Frederick, 134-5
 Select Committee, House, on Astronautics and
 Space Exploration:
 Accomplishments of, 2
 Events leading to establishment of, 1-8
 Hearings, 9-23
 Membership, 6
 Publications, 26-7
 Select Committee on Committees, House, (Bolling
 Committee), 426, 613, 699-714
 Shacknai, Jonah, 434
 Shaffer, John H., 758
 Shea, Dr. Joseph, 111
 Sheldon, Dr. Charles S. II, 9, 20, 25, 27, (photo),
 28 (photo), 34, 40, 42, 45, 446, 703-8
 Shepard, Alan B., Jr., 73, 89, 90, 203 (photo), 315,
 414
 Shuttle, Space, 191, 269-305, 412, 1010
 Siepert, Albert, 71
 "Silly-sounding" Projects, 527-9, 541-3, 546-7
 Silverstein, Dr. Abe, 193
 Simon, Representative Paul, 600
 Simpson, Dr. George L., Jr., 226-7, 264-5
 Singer, Dr. S. Fred, 136
 Sivk, Representative B. F., 7, 12 (photo), 25, 28
 (photo), 29, 32, 33, 46, 63, 66, 69, 70 (photo),
 71, 461, 553, 555
 Skylab, 230, 306 (photo), 307-13, 414
 Slaughter, Dr. John B. (photo), 444
 Slayton, Donald K. "Deke", 203 (photo)
 Small Business, House Select Committee on, 466
 Smith, Representative H. Allen, 458
 Smith, Representative Howard W., 50, 130, 174,
 454, 458, 460
 Smith, Philip M., 375-6
 Smith, Sidney, 366 (photo)
 Smith, Willis D., 906 (photo)
 Snap 8, 256
 Snow, Lord, 147, 382
 Social science research, 146-7
 Solandt, Dr. O. M., 384, 390 (photo), 455 (photo)
 Solar energy, 667-8, 674-89, 908-54, 1007
 Solar Energy Research, Development, and Demon-
 stration Act of 1974, 685-9, 911
 Solar Heating and Cooling Act, 674-81, 937, 949
 Solar photovoltaic legislation, 932-5, 949
 Solar satellite power, 682, 939-45
 Solid Propellants, Subcommittee on, 99
 Solid solvent refined coal (SRC), 800 (photo)
 Solid versus liquid propellants, 246-7
 Solid waste, 968-9, 994-5
 Solvent refined coal liquefaction plants (SRC), 856
 Soviet Academy of Sciences, 412
 Soviet nuclear energy developments, Wydler re-
 ports on 441-42
 Soviet scientists, civil rights of, 438-39
 Soviet space developments, 1-5, 29, 75-6, 101, 172,
 446
 Soviet, United States and, progress in space, 13, 172,
 446,
 Soviet Union, committee trip to, 416-7
 Soviet Union, cooperative agreements with, 377-8,
 407-8, 412-3, 438-9, 447 (*see also* Apollo-Soyuz)
 Space Act, National Aeronautics and, 2, 13, 19-22,
 24, 249
 Space Business Daily, 241
 Space, future of, 190-1, 280-1, 336-7, 340-1
 Space Nuclear Propulsion Office, 256
 Space Problems and Life Sciences, House Subcom-
 mittee on, 46
 Space program (*see* various headings on projects)
 Space Science, Subcommittee on, 99
 Space Science and Advanced Research and Tech-
 nology, Subcommittee on, 212-215
 Space Science and Applications, Subcommittee on,
 108-11, 142, 215-66, 307-65, 939-40
 Space Shuttle (*see* Shuttle, Space)
 Space task group, 79, 270, 280, 321
 Spacelab, 401, 412
 Special Committee on Space and Astronautics,
 Senate, 6
 Special Investigations, Subcommittee on, 43
 Spencer, Dr. William A., 743
 Spensley, James W. "Skip", 854 (photo), 855, 972-3,
 986, 992, 994
 Spilhaus, Dr. Athelstan, 57 (photo), 58
 Spinoffs from space program, 173, 263-5, 364-5, 742
 Sputnik I, 1-5, 8, 170
 Sputnik II, 3
 SST and aircraft noise, 780
 Staats, Elmer B. (Comptroller General), 873-4
 (*see also* General Accounting Office)
 Staebler, Representative Neil, 129, 211 (photo), 212
 Staff, committee, 33-6, 100-7, 172, 182 (*see also*
 minority staff)
 Stafford, Lt. Gen. Thomas F., 300, 418 (photo), 419,
 423 (photo)
 Staggers, Representative Harley O., 720, 838, 969

Standard Reference Data System, 149-50, 575-6
 Standards Policy, Interagency Committee on, 488
 Star City, U.S.S.R., 410, 416
 State, Department of, 10, 389, 437, 439-40, 445, 819
 Staub, Jerry, 740
 Steele, Representative Robert H., 568-9
 Steiger, Representative Sam, 689
 Steiger, Representative William A., 712
 Stennis, Senator John C., 188
 Stever, Dr. H. Guyford, 52, 57 (photo), 134, 411, 455, 505-25, 605, 606 (photo), 614, 617, 625, 635, 649-50
 Stockholm Conference, 402
 STOL, short takeoff and landing planes, 250-5, 754, 764
 Stoller, Morton J., 263-4
 Stone, Galen L., 862
 Stratton, Representative Sam, 71
 Strauss, Lewis L., 181
 Subcommittee (*see* title of)
 Subcommittee chairman's staff, 729-33, 803-4
 Subcommittee temporary chairmen, 762
 Suits, C. Guy, 136
 Sulfates in the atmosphere, 963-4
 Sullivan, Francis J., 228-9
 Supersonic technology, 767, 780, 790
 Surveyor, 214, 235-7
 Sustaining university program, 242-5
 Swartz, Carl, 184, 723
 Swigert, John L., Jr., 165, 319 (photo), 320, 335 (photo), 362, 420-22, 672, 684, 699, 706-7, 715, 723-8, 732-6, 803-4, 957
 Symington, Representative James W., 153, 241, 248, 310, 326-33, 327 (photo), 366 (photo), 404-8, 415, 427-31, 468-85 (metric system), 501, 513 (photo), 551, 571-3, 578-81, 584, 607, 612, 614, 619-20, 628, 631, 633, 641, 644, 646, 649, 662, 664 (photo), 688, 698, 708, 761, 769-71, 815, 839, 903, 922, 940
 Symms, Steven D., 681, 833, 971
 Syncom, 219, 240, 245
 Synthetic fuels, 693, 801-56, 1006

T

Tar sands, 692
 Task force on energy, 656-69
 Tate, Thomas N., 311 (photo), 362, 842 (photo), 849, 866
 Taylor, Representative Roy A., 142, 153, 219, 248
 Teague, Representative Olin E. "Tiger," 29, 32, 46-9, 56, 61, 62 (photo), 64, 70 (photo), 77, 85, 90, 95, 103, 111-4, 117-8, 125 (photo), 163-81, 165 (photo), 168 (photo), 200-8, 228, 269-305, 292 (photo), 308, 312-20, 319 (photo), 333, 346-9, 360-5, 378-9, 408, 412-7, 418 (photo), 421-4, 431-2, 437-9, 466-95, 508-97, 605-53, 657-62, 69-70, 678, 681-4, 696-702, 709-16, 729-31, 734, 741-7, 744 (photo), 778-9, 787, 790, 803-56 *passim*, 858-98, 861 (photo), 877 (photo), 908, 911, 915-16, 972, 1005, 1016
 "Tech Briefs," 264-5, 354
 Technology Assessment, Office of, 159-61, 429, 549-65, 581, 801-2, 897-8, 904

Technology transfer, 411, 602
 To OPEC countries, 428, 438, 447
 Technology utilization, 264-5, 353-60
 Teem, Dr. John, 907
 Teller, Dr. Edward, 859, 867
 Telstar, 218-9
 Texas, University of, 665, 670
 Thiokol Corp., 246
 Thomas, Representative Albert, 25, 50, 94 (photo), 175, 179, 186
 Thomason, Dr. Harry E., 679
 Thompson, Representative Frank, Jr., 725, 729, 779
 Thorndike, Dr. Alan M., 136
 Thornton, Representative Ray, 310, 334, 337, 347, 399, 424-9, 425 (photo), 507, 514, 532-4, 564-5, 573, 581-2, 586-92, 595-6, 602, 644, 650, 671, 674 (photo), 714, 762, 802, 819, 823, 829, 841, 903, 919, 921-4, 921 (photo), 930
 Three Mile Island, 894, 901-2
 Tiernan, Representative Robert O., 152, 206
 Timmons, William E., 756
 Tipton, Howard D., 570, 572
 Tiros, 215-6, 375
 Tirrell, Alexander S. (Pat), 478
 Titov, Gherman S., 107
 Tonry, Representative Richard A., 338, 782
 Townes, Charles, 527
 Townsend, Dr. John W., Jr., 399-400
 Trabandt, Charles A., 906 (photo)
 Tracking and data acquisition, 259-63, 344-53, 371-2
 Tracking and Data Relay Satellite System, 351-2
 Tracking ships, 261-2
 Train, Russell E., 402
 Transportation, Aviation and Communications, Subcommittee on, 794-9
 Transportation, Aviation and Weather, Subcommittee on, 780-94, 990
 TRW, 315
 Tsongas, Representative and Senator Paul E., 931
 Tunney, Senator John V., 924

U

USIA (U.S. Information Agency; *see* Information Agency, U.S.)
 U.S.S.R. (*see also* Soviet Union), cooperative agreements with, 174-6, 407, 428, 438-9
 Udall, Representative Morris K., 162, 686-8, 870, 1007-8
 Unidentified flying objects (UFO's), 13, 257-9
 United Nations
 Committee on Peaceful Uses of Outer Space, 445-6
 Conference on Science and Technology, 439-40
 Law of the Sea Conference, 432-3
 President Kennedy's address, 174, 412-3
 Uranium enrichment, 570-3
 Urey, Dr. Harold C., 135
 U-2, 373-8
 U.S.S.R. (*see* Soviet Union)

V

- Van Allen, Dr. James A., 4, 5-3, 57 (photo), 7 (photo)
- Vance, Cyrus R., Secretary of State, 5, 433, 435
- Vander Jagt, Representative Guy, 152-3, 232 (photo), 248, 267 (photo), 276
- Vander Myde, Paul A., 728
- Vanguard, 5, 7
- Van Pelt, Representative William K., 29, 98, 129, 211 (photo), 212
- Venus, 237-9, 352, 394
- Veterans' Administration, 744
- Veterans' Affairs Committee, House, 37, 97, 164, 274, 318-9, 697, 741-2
- Vevsa, Representative Victor, 691, 739
- Vienna, Austria, U.N. Conference on Science and Technology, 438-44
- Viking, Project, 273, 326, 331-3
- Vinson, Representative Carl, 8, 15, 17, 18, 30, 34, 40-3, 96, 130, 183
- Visitors Center, NASA, 176-80, 362
- Vivian, Representative Weston E., 138 (photo), 142-3, 216, 219, 238
- Volkmer, Representative Harold L., 342, 795, 796 (photo), 855, 901
- Voluntary Standards, 577-8
- von Braun, Dr. Wernher, 4, 6, 10, 13, 28 (photo), 39, 41, 62 (photo), 68-72, 70 (photo), 111, 136-7, 163, 167, 246, 314, 393 (photo), 414
- Von Braun team, 68-72
- Vovager, 238, 344

W

- Waggonner, Representative Joe, 70 (photo), 98, 129, 134, 142-3, 152-3, 169, 184, 206, 218, 231, 271, 276, 456
- Walger, Representative Doug., 301 (photo), 337, 342, 795, 841, 855, 897, 974, 1000 (photo)
- Walker, Peter, 402
- Walker, Representative Robert S., 337, 342, 431, 442 (photo), 583, 788, 855-6, 930, 934, 952, 974, 977, 986, 993, 1001
- Wall Street Journal, 475, 562, 820-1
- Walsh, Senator David I., 9
- Walsh, John, 1016
- Ward, Barbara Lee Jackson, Lady
- Warren, Earl, 610
- Washington Evening Star, 38, 90, 200, 747
- Washington Post, 6, 37, 80, 86, 107, 835
- Water pollution, 154, 961-2
- Water resources, 601-2
- Watergate, 423, 615, 626
- Waterman, Dr. Alan T., 51, 139
- Watkins, Representative Wes, 337 (photo), 342, 358, 543, 599, 600, 747, 841, 846, 856, 877, 930, 938, 974, 993, 995-6
- Watson, Dr. James D., 588
- Waxman, Representative Henry A., 334, 425, 590, 802, 829, 839, 903
- Ways and Means, House Committee on, 16, 31, 829, 823
- "We Propose," 183

- Weather modification, 971
- Weather Satellites, 88, 215-7, 376
- Weather Service (Bureau), U.S., 100, 136, 215-7, 489-90, 792-3, 990
- Weaver, Representative James D., 129, 134, 171, 210, 212, 222-3, 225, 243, 266 (photo)
- Webb, James E., 11, 61 (photo), 64-6, 75, 83, 93, 94 (photo), 99, 108, 166, 177, 185-90, 196-202, 205-7, 210 (photo), 221-2, 230-4, 242, 262, 294, 371 (photo)
- Webster, Daniel, 173
- Webster, Dr. Ferris, 988
- Weicker, Representative and Senator Lowell P., Jr., 153, 248
- Weis, Representative Jessica McC., 84, 98, 218
- Weiss, Representative Ted, 344, 767, 798
- Weitz, Paul, 310
- Wells, Dr. William G., Jr., 238, 255, 397, 431, 436, 439-41, 446, 531-2, 544, 626-7, 644, 684, 755, 758, 804
- Welsh, Dr. Edward C., 55, 61 (photo) 80-1, 190, 253, 261
- Wenk, Edward, 160
- West Valley, N.Y., nuclear waste at, 897, 900, 978
- Western Union Space Communications, Inc., 352
- Westwood, Mrs. Jean, 289
- Wetports, 753-4
- Wheaton, Mrs. Ann, 5
- Wheeling and Dealing*, 185
- Whipple, Dr. Fred L., 52, 57 (photo), 116
- Whitcomb, Dr. Richard T., 430 (photo)
- White, Maj. Gen. Edward H., 204-5
- White, Edward H. (astronaut), 193, 194, 204
- White, Representative Richard C., 342, 855, 898 (photo), 899, 1004
- White, Dr. Robert M., 984
- Whittaker Corp., 360
- Wiesner, Jerome B., 74-6, 77-8, 136, 498 (photo), 622
- Wilcox, Raymond, 9, 26, 27 (photo), 34
- Wilcox, Robert, 366 (photo)
- Wilkowski, Ambassador Jean, 439
- Williams, Senator John, 89
- Williams, Ron E., 851-2
- Willson, Robert, 496
- Wilson, Charles (Secretary of Defense), 4, 5
- Wilson, James E., 102, 133, 190, 196, 342, 416-7, 715
- Wilson, Dr. John T., 58
- Winn, Representative Larry, Jr., 152-3, 196, 205-6, 243-4, 276, 291, 298, 300-4, 307, 311 (photo), 316, 335 (photo), 335, 341, 349, 357, 407-11, 416, 419, 422, 446, 484, 509, 562, 621, 641, 647 (photo), 671, 723, 758, 773, 795, 880, 903, 908-9, 930, 941, 945, 957, 968, 971, 974, 977, 984, 993, 1009 (photo), 1010
- Winter, Harvey J., 412
- Wirth, Representative Timothy E., 335, 337, 514, 522, 641, 802, 820-5, 829, 867, 882, 898 (photo), 903, 910, 930, 936, 974, 978, 997
- Wirths, Theodore W., 144, 499
- Wolf, Representative Leonard G., 29, 212, 373

- Wolff, Representative Lester L., 128 (photo), 142, 152, 219, 248, 456
- Wolpe, Representative Howard, 342, 855, 894, 899, 901, 945 (photo), 951, 953
- Women as Astronauts, Subcommittee on, 99
- Woods, George D., 157, 384
- World Meteorological Organization, 215
- Wright, Representative Jim, 595, 718, 821, 837, 1006
- Wylder, Representative John W., 127, 129, 152-3, 171, 187, 198, 201-2, 205, 215-6, 218, 221, 225-30, 243, 250, 251 (photo), 257, 285-6, 291, 313, 316, 341-4, 348, 420, 441 (photo), 441-2, 448, 457, 459-60, 480, 509, 519, 537-9, 548, 552-3, 562, 576, 583, 595, 599, 600, 621, 633-5, 640, 671, 708, 712, 723, 727 (photo), 728-31, 749-99, 760 (photo), 828, 842 (photo), 846-7, 862-3, 867, 874, 877, 880, 885, 890, 893, 898-9, 900 (photo), 902-3, 916-18, 932, 936-8, 942-50, 972, 983, 989, 993, 1010
- Wylic, Representative Chalmers P., 680, 934

XYZ

X-15, 117

Yardley, Dr. John, 304

Yates, Representative Sidney R., 808, 852

Yeager, Philip B., 9, 17, 27 (photo), 34, 101-2, 128 (photo), 132-4, 160, 386, 387 (photo), 388, 403, 499, 532, 544, 555, 561, 565, 581-2, 613, 616, 621, 626-8, 635, 642-4, 648, 684, 1011-12

York, Dr. Herbert F., 10, 41

Young, Representative C. W. (Bill), 706

Young, John W. (astronaut), 185, 315

Young, Representative John, 482

Young, Representative Robert A., 338, 342, 448 (photo), 782, 855, 899, 930

Zablocki, Representative Clement J., 437, 439, 447

Zarb, Frank, 687-8, 802, 827

Zucrow, Prof. Maurice J., 52, 57 (photo)





